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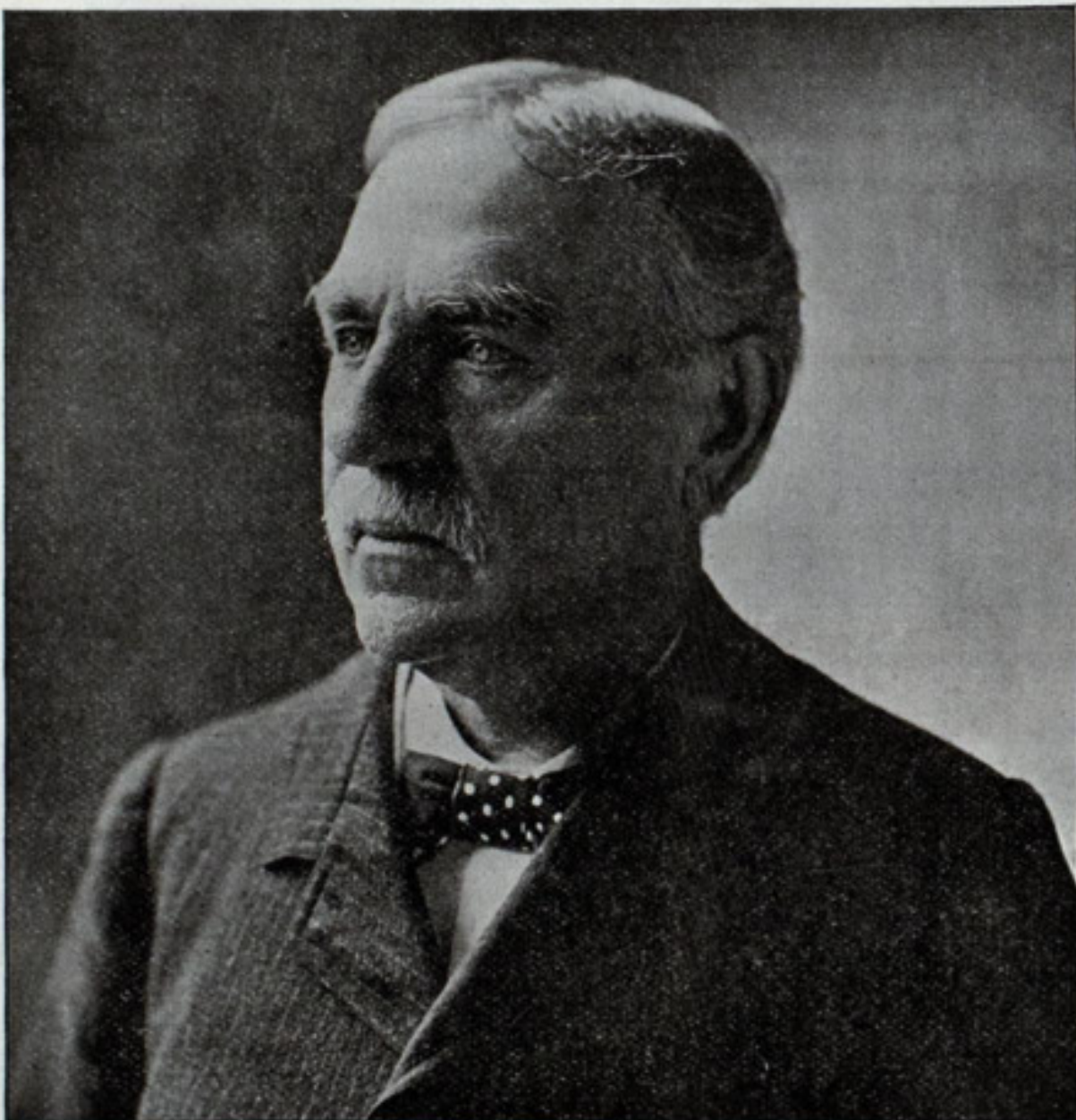
THE SHIPPING BILL.

SENATORS AND REPRESENTATIVES DISCUSS THE MEASURE AND GIVE REASONS FOR ITS PASSAGE.

The Marine Review submits herewith a few of a series of letters which it has received from United States senators and representatives regarding the shipping bill. Senator Frye in his letter, as will be noted, definitely states that he will endeavor to have the bill considered as "unfinished business," in which case it would precede the Nicaraguan bill, even though that bill is scheduled for an early hearing. It is too early to discuss the probability of the passage of the bill. It ought to pass, of course. There is no avenue of industry in which labor plays so important a part as ship building. The cost of a ship, that is, the mere placing together of its component parts, is largely labor. In addition, the cost of the material which enters into ship construction is largely labor. Iron ore in the ground is not worth 50 cents a ton. Rolled into ship plates it is worth many dollars per ton. The difference between these costs is only labor—the labor of getting it out of the earth, of transporting it on the railways, and on ships to the furnaces. Hundreds are employed in the process of transition. The shipping bill would benefit the artist and artisan. There is not an industry in the country which would not feel its beneficent influence. Whether the bill will pass is problematical. It will pass if it gets to a vote; but it may be talked to death in the senate. Among the letters referred to above are the following:

FROM SENATOR WILLIAM P. FRYE.

"It is impossible for me to give you an exact program for the shipping bill at the coming session. I intend at the earliest possible moment, if I can, to have it made the 'unfinished business' and to keep it in that



HON. WM. P. FRYE, AUTHORITY IN THE UNITED STATES SENATE ON SHIPPING AFFAIRS.

condition just as long as a majority vote of the senate will permit me to. That there are difficulties in the way of final action at this short session is certain. The Nicaragua canal bill has been made a special order for the second Wednesday. While, under the rules, that would not displace unfinished business, yet the bill has many friends on both sides of the chamber, possibly enough to displace the shipping bill and secure action on that. Again, it will be in the power of a minority, determined and regardless of fair and dignified action, to block the way and prevent final action. In view of the fact that the next congress is overwhelmingly Republican, I am hardly looking for such a proceeding. I believe that if a vote can be reached, the bill, which is one of the best considered and most carefully drawn ever presented to congress, will receive a good majority vote. I do not care now to advance any argument in its favor. I am very glad that the Marine Review is cordially supporting it."

REPRESENTATIVE SERENO E. PAYNE.

"While I introduced the shipping bill during the present session and it contains two important amendments suggested by myself, one of which limits the amount to be expended in any one year to \$9,000,000, yet it

was reported in this congress to the house by Gen. Grosvenor, as chairman of the committee on merchant marine and fisheries. He will have charge of the bill in the house. It is his intention, I understand, to call it up at an early day and push it to its passage. I shall certainly do all I can to second his efforts in that behalf. The times seem right for the passage of this bill. While our coast and inland marine is second to none in the world, we have, as everyone knows, not enough vessels to carry 9 per cent. of our foreign commerce. I believe that with our present ship building facilities the aid given by this bill would employ every ship yard and double their number inside of the next five years; that it will operate like the protective tariff, stimulating the perfection of American machinery to build ships, and we should soon find ourselves able to compete with the world in building steel vessels. I believe also that we should be able to perfect the vessels made in such manner as to reduce the cost of navigating them, and thus put our people where they would be able to compete with the merchant marine of the world. In other words, I believe it will solve the problem of regaining our own carrying trade in our own vessels under the American flag."

SENATOR J. H. GALLINGER.

"It is impossible for me to speak definitely as to the chances of passing the shipping bill at the coming session of congress, but I earnestly hope that it may be promptly enacted into law. The danger of its defeat lies in the fact that it is a short session, and with the appropriation bills demanding attention dilatory tactics can probably be resorted to successfully to defeat its consideration. I am hopeful that a vote on the measure will be reached, and if so its passage is assured. Personally I shall do everything in my power to accomplish that most desirable result."

SENATOR J. R. HAWLEY.

"The session of congress opens in a fortnight hence. Very few indeed of the members of either house are in town. As to my view of the prospects of the shipping bill, I might as well undertake to describe the weather during the coming session. I do not know with what temper the Republican leaders will approach the bill. I can only say that I am heartily in favor of the best bill that can be drawn on that question, and that I agree with Senator Frye of Maine, who has the matter in charge."

SENATOR F. E. WARREN.

"I think we ought to have earnest and early consideration of the shipping bill and that the business interests affected by it are entitled to an early settlement of the question. I have always favored legislation along the lines of the measure in question, and will continue to aid in all efforts to promote the shipping interests of the country."

SENATOR WILLIAM J. SEWELL.

"While I am heartily in favor of the shipping bill and believe it is highly essential to increase the merchant marine of this country, I cannot give you an opinion as to its status, as I do not think any member of congress should predict the action of that body in these matters."

FRANCIS T. BOWLES TO BE CHIEF CONSTRUCTOR.

It is stated authoritatively at Washington that Naval Constructor Francis T. Bowles will be appointed chief constructor of the navy on the retirement for age of Chief Constructor Philip Hichborn on March 4 next. Constructor Bowles, although quite a young man, is the senior officer of those officers of the construction corps who were educated at the naval academy and received a technical education in marine architecture. He is fourth in the list of constructors with the relative rank of captain. Mr. Bowles entered the naval academy in Sept., 1875, from Massachusetts, and graduated at the head of his class. Since Aug. 1, 1895, he has been in charge of the construction department of the Brooklyn navy yard. While at the Norfolk navy yard, in the 80's, he superintended the construction of the battleship Texas, and when complaints were made that the vessel would be unstable, staked his professional reputation to the contrary and was triumphant. As chief constructor Mr. Bowles will have the rank of rear admiral. He was presented to President McKinley by Secretary Long on Monday of this week.

CONTRACTS FOR SEVEN VESSELS.

The Craig Ship Building Co. of Toledo has certainly secured its share of orders for new vessels. There are now seven steel steam vessels building or under contract at the Toledo works. Late orders include two passenger and freight steamers of 13½ knots speed, which are to be used by the United Fruit Co. in the transportation of freight and passengers from the West Indies to North American ports, also a passenger steamer of 226 ft. length for the Arnold Transportation Co. of Mackinac, Mich., somewhat similar to but larger than the fast steamer Chippewa, built last winter for that company. Announcement has already been made of the orders for the other four vessels. They are: Freight steamer of St. Lawrence canal dimensions, designed for salt water service, for Hawgood Transportation Co. of Cleveland; fast passenger steamer, 180 ft. long, for Lake Superior service of Booth Packing Co.; passenger steamer of 240 ft. length for Holland & Chicago Trans. Co.; passenger steamer, 150 ft. long, for service between Sandusky and the islands of Lake Erie.

The navy department has been advised that the big naval dry dock at Port Royal has suffered further damage by the bulging and swelling of the timber sides, which will take about \$6,000 to repair. A chart forwarded by the commandant there shows seven distinct points where the bulging has occurred. Aside from the immediate loss, naval officials say the bulging involves some possibility of a collapse of the structure under adverse circumstances, although it is expected that repairs will make it serviceable for all ordinary needs.

THE FIVE NEW BATTLESHIPS.

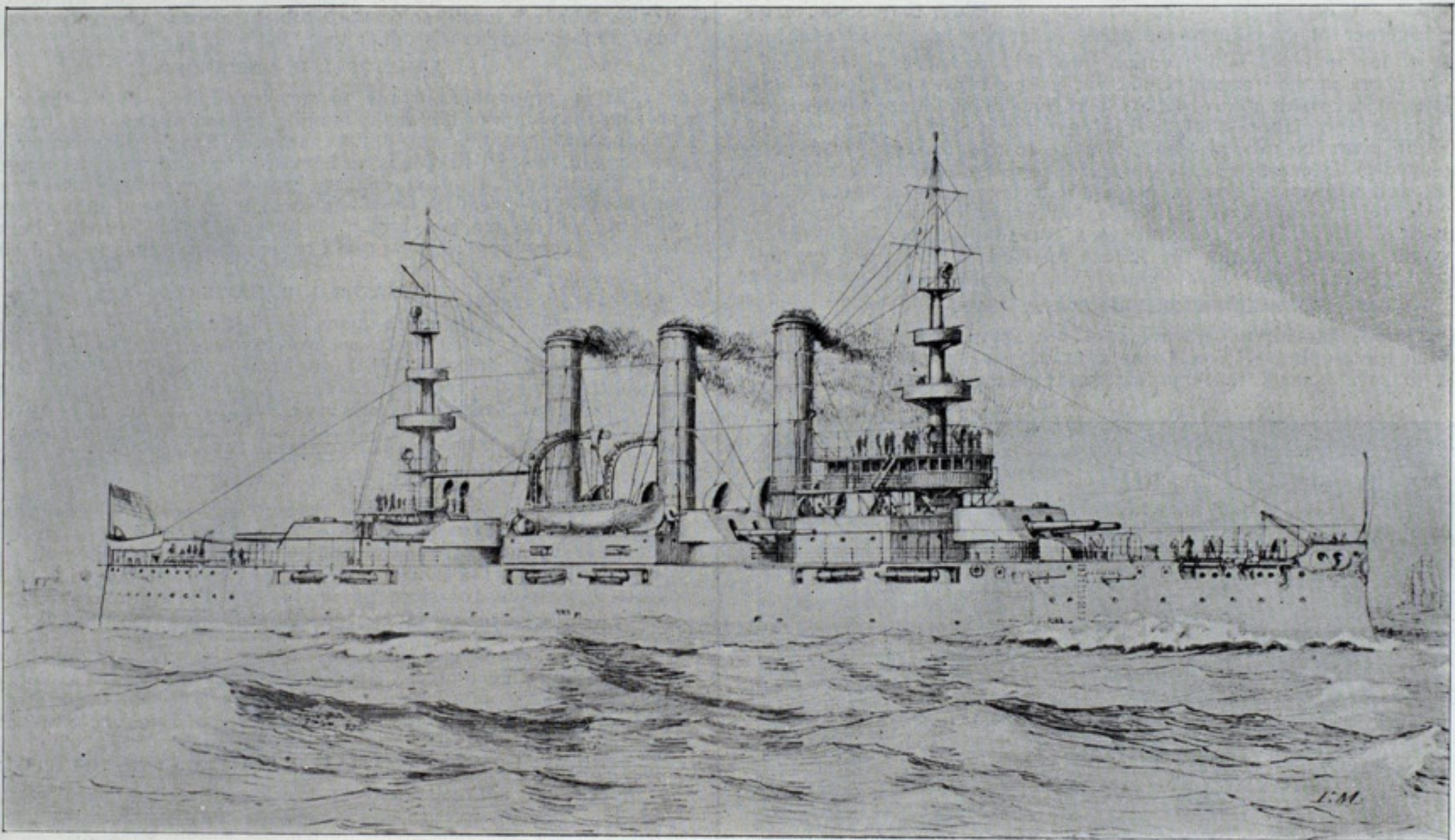
THREE OF THEM ARE TO HAVE THE SUPERPOSED TURRETS—TWO TO HAVE SINGLE TURRETS—THREE ARE ALSO TO BE SHEATHED AND COPPERED—BIDS TO BE OPENED SOON.

When congress, in March, 1899, appropriated money for three sea-going coast-line battleships carrying the heaviest armor and most powerful armament for vessels of their class, it was evidently intended to provide for vessels more powerful than those of any other nation in the world. The unfortunate provision by which the contracting for the vessels was made subject to an agreement as to the price of armor, while it delayed the work in connection with these important vessels, served one good purpose in making it possible to combine with those appropriated for by the fifty-fifth congress the two provided for by the act of June 7, 1900. The bureau of construction and repair, in the designs for these five vessels, has fully carried out the evident purpose of congress, and the designs now approaching completion in that bureau represent five of the most powerful battleships which have ever been projected. The vessels appropriated for in 1899 are required to be sheathed and coppered, whereas those of the later appropriation have been held by the navy department not to be covered by the provision as to sheathing, and the bureau of construction and repair has, therefore, designed two classes of vessels—one sheathed and the other not sheathed. The designs have

driven by two four-cylinder, triple-expansion engines of about 19,000 I.H.P., having a stroke of 4 ft., running, under conditions of maximum speed, at about 120 revolutions per minute. The steam necessary to this power will be supplied at a pressure of 250 lbs. by twenty-four Babcock & Wilcox straight water tube boilers, placed four in each of six independent water tight compartments.

Each ship will carry four 12-in. guns, forty calibers in length, mounted in pairs in Hichborn balanced turrets having an arc of train of 270°, one forward and one aft in each vessel. Now, as to the eight 8-in. guns, 45 calibers in length, which will be carried on each vessel: In the three sheathed vessels, four will be mounted in turrets of the Hichborn type, superposed upon the 12-in. turrets above mentioned, and four in two turrets amidships, the amidships turrets having an arc of train of 180°; and in the two unsheathed vessels, all eight 8-in. guns will be mounted in four independent turrets, each having an arc of train of 145°, placed two on each side at the ends of the superstructure, thus forming a quadrilateral. In each vessel there will be a broadside of twelve 6-in. rapid-fire guns, 50 calibers in length, mounted, six on each side, on the main deck, each with an arc of train of 110°, and each will also have twelve 14-pounders and twelve 3-pounders, mounted in commanding positions and having very large arcs of fire. In the two lower tops there will be four automatic 1-pounders, and in the upper tops four single-shot 1-pounders.

Experience having shown that above-water torpedo tubes are not only inefficient weapons, but a menace to their possessors, the vessels are



THE RHODE ISLAND CLASS OF BATTLESHIPS.

been further complicated by the decision of the board on construction to fit three of the vessels with the superposed turret, similar to those on the Kearsarge and Kentucky, and to provide the other two vessels with what has been designated the "quadrilateral arrangement" of the 8-in. guns of the main battery. The provisions of the acts for the five vessels have, therefore, been covered by designs prepared in the bureau of construction and repair for three sheathed and coppered battleships carrying superposed turrets, and two unsheathed battleships with the "quadrilateral arrangement" of 8-in. turrets. The general dimensions and chief characteristics of the vessels are:

GENERAL DIMENSIONS OF SHEATHED AND COPPERED VESSELS.

Length on load water line.....	435 ft.
Breadth, extreme, at load water line.....	76 ft. 10 in.
Trial displacement, about	15,000 tons
Mean draught at trial displacement, about.....	24 ft.
Greatest draught, full load, about.....	26 ft.

GENERAL DIMENSIONS OF UNSHEATHED VESSELS.

Length on load water line.....	435 ft.
Breadth, extreme, at load water line.....	76 ft. 2½ in.
Trial displacement, about	14,600 tons
Mean, draught, at trial displacement, about.....	24 ft.
Greatest draught, full load, about.....	26 ft.

In the 15,000 tons represented in each of these vessels the many antagonistic qualities essential to a perfect fighting machine have been compromised and incorporated in proportions which experience seems to have pointed out as the most desirable and efficient. To begin with, these battleships will have a speed of at least 19 knots, which compares most favorably with any battleships under construction abroad, as well as with any in the projected stage. As all of the vessels previously designed by the bureau of construction and repair have shown material excess of speed over that called for, it may be expected that this figure will be exceeded by from a quarter to a half knot.

The vessels will be propelled at this high speed by twin screws

fitted only with submarine torpedo tubes. Two of these are located in one compartment, one on each side, fitted for the discharge of the large 18-in. Whitehead torpedo, and provision is made for carrying stored in the torpedo room six of these formidable engines of war. The magazines of the vessels will be specially fitted to enable them to carry, with absolute safety in all climates, the new smokeless powder, and with this end in view, provision is being made for their artificial cooling, by pipes led from the cold storage system of the vessel, in such cases as may be necessary. Provision will be made in the magazines for the stowage of at least 60 rounds for each of the 12-in. guns, representing a weight of about 144 tons; 125 rounds for each of the 8-in. guns, weighing about 180 tons; 200 rounds for each of the 6-in. guns, the weight of which will be about 190 tons; 500 rounds for each of the 3-pounder and 1-pounder guns, and an almost inexhaustible supply of ammunition for the smaller guns.

So much for the vessels' offensive qualities. To make their defensive qualities proportionately great they are to be provided with a complete water line belt of armor 8 ft. in width amidships, 11 in. thick at the top and 8 in. at the bottom, tapering to a uniform thickness of 4 in. at the ends of the vessel. They will also have an armored belt extending over 245 ft. of their length, of a uniform thickness of 6 in., rising from the top of the main belt to the upper or main deck, and joined at its after end to the barrette of the 12-in. turret by a 6-in. armored bulkhead, and having at its forward end an inclined armored bulkhead from side to side 6 in. thick, thus forming a citadel or redoubt within which the 6-in. guns will be mounted. The barbettes for the turrets of the 12-in. guns are to be 10 in. in thickness for that portion outside of the redoubt or citadel, reduced to 6 in. in thickness within. The turrets themselves will be protected by armor 10 in. in thickness, the portholes, however, being 11 in. The 8-in. turrets will in all cases, whether superposed or independent, be protected by 6 in. of armor, with 6½ in. port plates, and their barbettes will be protected by similar armor. The conning tower and its shield will be 9 in. in thickness, and the armored tubes will be protected by 6 in. of armor and will be of sufficient size not only to receive all the voice pipes, wiring, etc., but to also permit of their being used as a passageway, if necessary. In addition to the conning tower there will be

aft a second tower known as the signal tower, which will be protected by 5 in. armor. From the bottom of the water line armor belt there will rise a curved turtle-backed nickel steel protective deck $1\frac{1}{2}$ in. thick on the flat and 3 in. thick on the sloping sides, to make assurance doubly sure that no projectile of the enemy finds its way into the vitals of the ship. As an additional protection to stability, a cofferdam belt 3 ft. in thickness and packed to a density of 8 lbs. to the cubic foot, will be worked along the two sides, above the protective deck, for the entire length of the vessel.

The material of construction will, of course, be of the high quality of steel which has entered into all the vessels of our navy. The main or upper deck, in addition to being built of steel, will be the only one upon which wood is to be laid. The lower decks will be of steel, covered with linoleum or some other like material. The use of wood in the construction of the vessels will be limited even more strictly than it has been in the later battleships, and all wood except that for the sheathing of the bottom will be electric fireproofed. Bilge keels and heavy docking keels will be fitted.

It is proposed to make all of these vessels flagships, and to do this it is necessary to make provision for the accommodation of one flag officer, one commanding officer, one chief of staff, twenty ward room officers, twelve junior officers, ten warrant officers and 658 crew and marines, making a grand total of 703. Both officers and crew will have wash rooms, bath rooms and other similar conveniences such as will place the comfort and healthfulness of these vessels very high in the scale.

The applications of electricity on board are very much wider than in

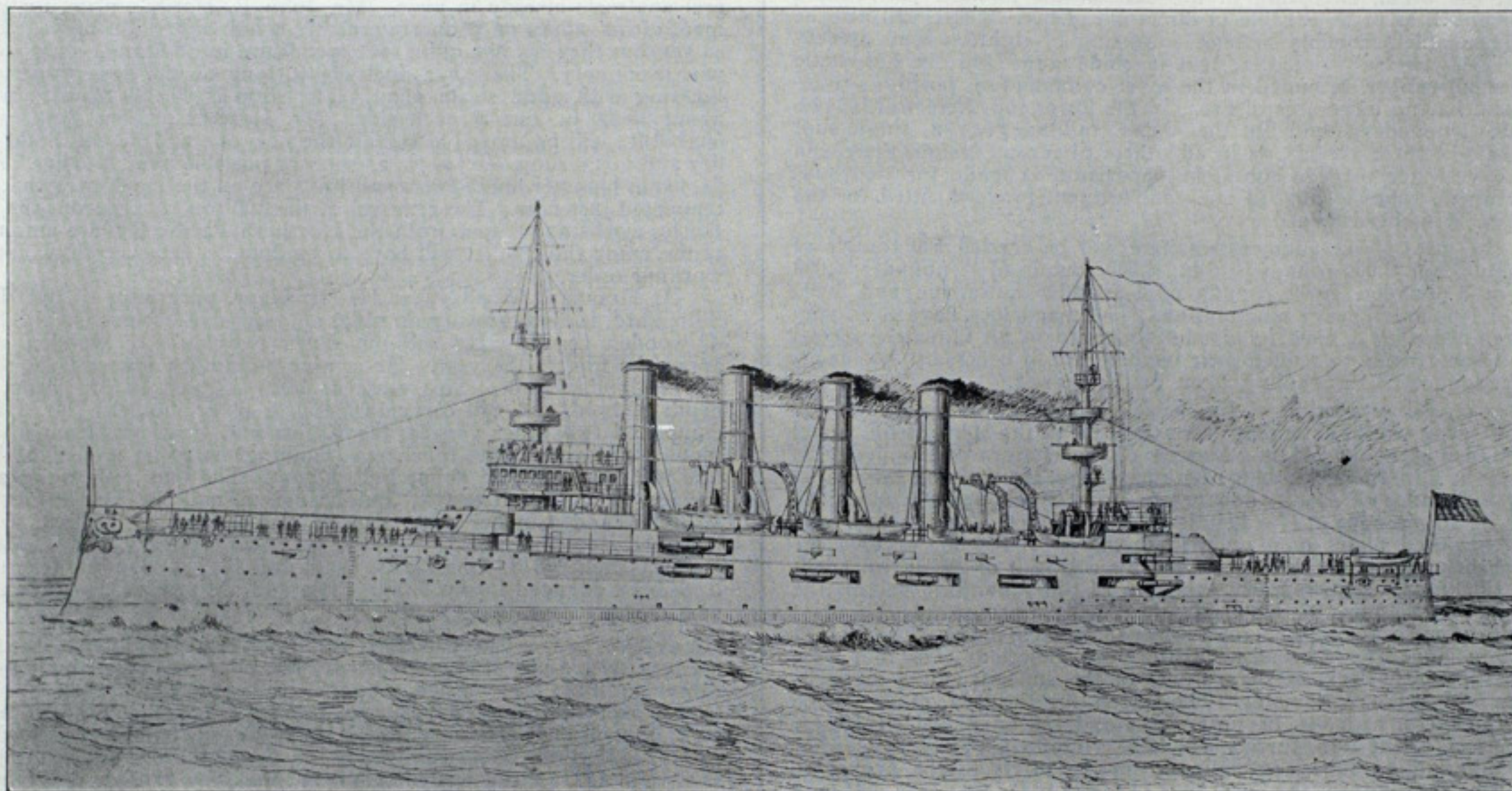
THE SIX NEW ARMORED CRUISERS.

SHIPS THAT WILL BE SUPERIOR IN FIGHTING CAPABILITIES TO ANY ARMORED CRUISERS NOW IN SERVICE OR PROJECTED—GENERAL DESCRIPTION OF THE VESSELS—BIDS TO BE OPENED SHORTLY.

The navy of this country has, in the matter of fast armored cruising vessels, practically stood still since the construction of the highly successful New York and Brooklyn. In the meantime, England, France and Germany have been devoting much attention to the development of armored cruisers which, while possessing very high speeds, embody many of the qualities of battleships. In fact, modifications in one direction in the battleship, and the changes in another direction in the armored cruiser have brought the two, in foreign practice, very closely indeed to one another.

England now has already all of the Cressy class, comprising the Cressy, Sutlej, Aboukir, Euryalus, Hogue and Bacchante, 440 ft. long, 12,000 tons displacement, sheathed and coppered, with 21,000 H. P. and 21 knots speed, so far advanced that they could be gotten ready for active service on very short notice. France, at the same time, has completed her famous Jeanne d'Arc, 477 ft. long, of 11,300 tons displacement, 28,000 H.P. and a speed of 23 knots, practically ready for service. Germany also has but recently sent her Furst Bismarck, 393 ft. long, 10,600 tons displacement, sheathed and coppered, 14,000 H.P. and 19 knots speed, to the far east.

We, however, have so far neglected this element of the fleet that we have at the present moment no vessel directly comparable in class with



THE CALIFORNIA CLASS OF ARMORED CRUISERS.

the case of any other battleships in existence, with the possible exception of the Kearsarge and Kentucky. All of the turrets have electrical turning gear, and the ammunition hoists, blowers to the turrets and general ventilation, the general workshop, and practically all of the auxiliaries, outside of the engineers' department and excepting capstan and steering gear, are to be electrically driven. To provide for the power required for these purposes there will be installed in the three ships with superposed turrets, eight engines and dynamos, mounted on combination bed plates—two having a rated output of 1,250 amperes at 80 volts, and six with 625 amperes at 80 volts. The two ships with the 8-in. guns in quadrilateral arrangement will be provided with ten engines and dynamos, mounted on combination bed plates—two with a rated output of 1,250 amperes at 80 volts and eight with 625 amperes at 80 volts.

All indications seem to point to very spirited bidding upon these vessels, and from the number of inquiries being received and the general interest taken in the new designs, Chief Constructor Hichborn believes it highly probable that the competition for the construction of these ships will be even keener than that experienced in the case of any of the earlier battleships. The names of the battleships are Georgia, New Jersey, Pennsylvania, Rhode Island and Virginia.

ANOTHER STEAMSHIP RECORD ESTABLISHED.

The new steamer Sierra, built at Cramps, Philadelphia, for the Oceanic Steamship Co., has just arrived at San Francisco after a voyage of 39 days, 16 hours. This time smashes the record which has been held for seventeen years by the Alameda. The Alameda's time was 45 days. The Sierra is one of three Spreckles sister ships that are to ply on the Pacific, her mates being the Sonoma and Ventura. During the entire trip the Sierra behaved splendidly. Her length is 425 ft.; beam, 50 ft. and burden, 6,000 tons. The service that will be inaugurated by the Sierra will shorten the sailing trip between San Francisco and other Pacific ports. From San Francisco to Honolulu the new schedule calls for $5\frac{1}{2}$ days; to Samoa, $12\frac{1}{2}$ days; to Auckland, $15\frac{1}{2}$ days; to Sydney, 20 days.

those enumerated above. Congress more than a year ago, upon the urgent representations of the navy department, authorized the construction of three sheathed and coppered, armored cruisers of the highest class, but unfortunately so arranged the armor question involved as to prevent anything being undertaken with the cruisers until the settlement of this question. But for this we should by now have had three of these vessels in an advanced stage of construction. The fifty-fifth congress, realizing the necessity for still further increasing this section of the navy, made provision for three more armored cruisers. The delay in the armored cruisers first authorized, while unfortunate in a great many ways, has been productive of some good in making it possible to arrange for all six vessels to be virtually of the same design, the three sheathed and coppered being practically in no other respect different from the other three vessels of the same class unsheathed.

It may be said without the least hesitation that the new armored cruisers, designs for which have been worked out under the direction of the chief constructor, Admiral Hichborn, in the greatest detail, are, or rather will be when completed, superior in fighting capabilities to any armored cruisers now in service or projected. The illustration presented herewith gives an excellent idea of how these extremely formidable cruisers will appear when completed and at sea.

As stated before, three of the ships are to be sheathed and coppered and the remaining three will be unsheathed. Admiral Hichborn is strongly in favor of sheathing and coppering a sufficient number of our ships for protracted service away from docks, and feels certain that the performances of the three sheathed ships, three months after docking, will show a material improvement over the performances of the unsheathed ships of the same class after the same period after docking.

DIMENSIONS OF THE SHEATHED SHIPS.

Length on load water line.....	502 ft.
Breadth, extreme	70 ft.
Trial displacement, about	13,800 tons
Mean draught at trial displacement, about.....	24 ft. 6 in.
Extreme draught at full load, about.....	26 ft. 6 in.

DIMENSIONS OF THE UNSHEATHED VESSELS.

Length on load water line.....	502 ft.
Breadth, extreme	69 ft. 6 in.
Trial displacement, about	13,400 tons
Mean draught at trial displacement, about.....	24 ft. 6 in.
Extreme draught at full load, about.....	26 ft. 6 in.

In order that the vessels may have an effective steaming radius consistent with their other qualities, provision has been made for a total bunker capacity of 2,000 tons, a figure which is understood to be materially greater than that of any similar foreign vessels. The ships will be propelled by twin-screw, four-cylinder, triple-expansion engines of 23,000 I.H.P., having a stroke of 4 ft. and running at about 120 revolutions per minute. To produce this enormous power there are thirty boilers in eight separate water tight compartments, representing a total of 1590 sq. ft. of grate surface, and 68,000 sq. ft. of heating surface. These boilers will supply steam to the propelling engines at a pressure of about 250 lbs. and with the power thus developed it is intended that the vessel shall be propelled at a speed of at least 22 knots per hour.

The armament of each of these vessels will consist of four 8-in. guns, mounted in pairs in two Highborn electrically controlled, elliptical, balanced turrets, placed on the middle line, one forward and one aft, each having an arc of train of at least 270°. On the upper deck, at the corners of the superstructure, there will be four 6-in. guns, mounted in sponsons, one in each corner, and each having either a bow or stern fire, with an arc of train of at least 145°. There will be, in addition, the gun deck battery of ten 6-in. guns forming a broadside, five on each side, the arc of fire of each being not less than 110°, or at least 55° forward and 55° abaft the beam, excepting in the case of the forward pair, which are so arranged as to be capable of direct ahead fire. There will also be a very formidable secondary battery, consisting of eighteen 3-in. breech-loading rifles, twelve 3-pounder, two machine guns and six automatic guns of small caliber, mounted in the most commanding positions practicable, and having large arcs of fire. In the lower top there will be two automatic 1-pounders, and in the upper military top a single-shot 1-pounder. In these vessels, as in all others of recent design, there will be no above-water torpedo tubes, but provision is made for two submarine torpedo tubes located in one compartment forward, fitted for the long, 18-in. Whitehead torpedo.

For the guns above enumerated there will be carried 500 rounds of 8-in. ammunition, 2,000 rounds of 6-in., 4,500 rounds of 14-pounder, 6,000 rounds of 3-pounder, 2,000 rounds of 1-pounder automatic and 1,200 rounds of 1-pounder heavy ammunition. The magazines have been specially designed with a view to absolute security in all climates, special provision being made to reduce their temperature, if necessary, by means of connections with the cooling plant of the vessels.

The armored protection of the vessels will consist of a water line belt 7 ft. 6 in. in width, extending from the bow to the stern of the vessel for a distance of about 244 ft. Abreast of the engines and boilers this armor will be 6 in. in thickness for its upper edge, maintaining this thickness for a distance of 4½ ft. downward, from which point it tapers to 5 in. at its lower edge. The belt is to be completed to the bow and stern by armored plates of a uniform thickness of 3½ in. Above the water line belt the side will be protected for a length of 232 ft. by a belt 5 in. in thickness, extending from the top of the water line belt to the main deck. At the ends of this armor there will be armored bulkheads 4 in. in thickness, so forming an inclosed citadel or casemate within which the ten 6-in. guns of the broadside battery are mounted. The four 6-in. guns on the upper deck, at the corners of the superstructure, are protected by 5-in. armor casemates. The turrets for the 8-in. guns will be 6 in. in thickness, with 6½ in. port plates and 1½ in. nickel steel tops. The barbettes of the 8-in. turrets will have a uniform thickness of 6 in. and the ammunition tubes, extending from the turret to the protective deck, will have a uniform thickness of 3 in. The conning tower will be 9 in. in thickness, with a 2-in. nickel steel top, and from its base to the protective deck there will be an armored tube 5 in. in thickness and of sufficient diameter not only to permit of the accommodation of speaking tubes, etc., but also access to the conning tower from below the protective deck. The signal tower aft will be 5 in. in thickness. A complete oil tempered and annealed nickel steel protective deck, 1½ in. thick on the flat and 4 in. thick on the sloping sides, is to extend the entire length of the vessel, and a cellulose cofferdam belt 3 in. in thickness, as an additional protection against water line damage which might affect the stability, will be worked along both sides, above the protective deck, for the entire length of the vessel.

Each of the vessels is to be fitted as a flagship, and provision is made for the proper accommodation of a full complement of officers and men, comprising one flag officer, one commanding officer, one chief of staff, twenty ward room officers, twelve junior officers, ten warrant officers and 777 crew, making a grand total of 822 souls.

The material of which the vessels will be constructed will be mild steel, of the high quality which has been employed by the bureau of construction and repair in all vessels for the navy. In pursuance of the policy inaugurated some years since by Admiral Highborn, the amount of inflammable material employed in the construction of these ships will be even less than that in the vessels recently completed. The main deck will be a complete steel deck, and will be the only one upon which wood is laid; the lower decks will be of steel, covered with linoleum; and the use of wood or other inflammable material will be limited to the least possible, and much of the furniture, formerly made from fire-proofed wood, will probably be made of steel or some other metal.

Electricity will be extensively used for the transmission of power necessary for the many auxiliaries. The electric generating plant will consist of seven units, each consisting of an engine and dynamo mounted on a combination bed plate. Three of these units will have a rated output of 1,250 amperes each at 80 volts, and the remaining four a rated output of 625 amperes at the same voltage. They will supply, in addition to the current for lighting the vessel, sufficient power for operating the turret turning gear, ammunition hoists, blowers for the hull and turret ventilation, rammers for the heavy guns, elevating gear for the heavy guns, air compressors for charging the torpedoes, machinery in the general workshop, etc. A limited number of the auxiliaries, as, for instance, steering

engine, anchor and capstan engine and ash hoisting engines, will be steam driven.

The names of these armored cruisers are West Virginia, Nebraska, California, Maryland, Colorado and South Dakota.

ENLARGING PACIFIC COAST YARDS.

ORDERS PLACED FOR STEEL BUILDINGS OF NEW RISDON IRON WORKS PLANT—ACTIVITY ON PUGET SOUND—NOTES FROM THE SHIP YARDS.

From the Puget sound district, as well as from San Francisco, comes information regarding the enlargement of ship yard properties on a large scale. It was announced several weeks ago that the Risdon Iron Works of San Francisco contemplated the establishment of a new ship building plant, and now the Review is advised by telegram from that company that contracts have been let for some of the buildings. The buildings are to be all steel and the orders just placed with Jones & Laughlins, Ltd., of Pittsburgh are for a machine and ship blacksmith shop of 306 ft. length and 60 ft. width; a ship tool room and mould loft of 483 ft. length and 65 ft. width, and a power house of 75 ft. length and 110 ft. width.

As announced in the Review last week, Mr. John J. Hill, who was very successful for a great number of years in the building of wooden vessels at Marine City, Mich., for lake service, will very probably have some interests in common with John B. Hardy at Tacoma, Wash. Mr. Hill has leased at Tacoma a three-acre tract with frontage of 600 ft. on the Puyallup river, about 500 ft. south of property owned by Mr. Hardy. Mr. Hill will put up buildings and install machinery at once, and within a month will be ready to build wooden vessels of any size. He has several contracts already in view. Mr. John B. Hardy's plans for enlargement of his works on property recently acquired are not fully determined as yet, but they involve quite an expenditure in additional shop room and new machinery. There is a dock 350 ft. long on the new property and a building with good steam plant. The shop is 60x140 ft. with wings of about 25x30 ft., one at each side. Mr. Hardy's present shop, which is 50x130 ft., will be moved alongside the new one and he will build a foundry and forge shop, 60x140 ft., as soon as possible after moving. A 1,200-lb. steam hammer and some small tools are all the machinery that is contemplated just now. The removal of the 100-ton shears from the present Hardy works and a spur from the Northern Pacific Ry. are among some of the many things that will have to be done to get everything into good working order.

At Hoquiam, Wash., Geo. H. Hitchings, proprietor of the Hoquiam Ship Yard, is also carrying on quite an extensive business in the building of wooden vessels. He will put down two keels of wooden steamers about the first of the year. He is now building a four-masted schooner for the lumber trade. This vessel is 182½ ft. long, 38½ ft. beam, 14½ ft. depth of hold, and will carry 1,000,000 ft. of fir lumber. Mr. Hitchings completed two other vessels, the Kailua and Fearless, from the same moulds this year. The third one (building) is to be named Mahukona. She will be completed about Feb. 1 next. The two with Kanaka names are for Hind, Rolph & Co., San Francisco, and the Fearless is for the E. K. Wood Lumber Co., also of San Francisco. There was also launched from this yard during the year two steamers, Robt. Dollar and Rainier, each 208 ft. long, 38 ft. beam and 14½ ft. depth. These vessels have been engaged in the Nome trade and are said to have already paid nearly 50 per cent. in dividends.

Following is a list of wooden vessels built at Waldoboro, Me., during the past twelve years: Five-masted schooner Gov. Ames, built by Levitt Storer in 1888; four-masted schooner Augustus Welt, built by Welt & Co., in 1889; four-masted schooner J. W. Fitch, built by Levitt Storer in 1890; four-masted schooner Hattie B. Simpson, built by A. R. Reed & Co., in 1891; three-masted schooner Ida C. Southard, built by A. R. Reed & Co., in 1892; three-masted schooner Madaline Cooney, built by A. R. Reed & Co., in 1892; four-masted schooner Fannie Palmer, built by George L. Welt, 1900.

The New England Ship Building Co., Bath, Me., launched the five-masted wooden schooner Louise B. Crary last week. The vessel's dimensions are: Keel, 250 ft.; beam, 46 ft.; length of masts, 115 ft.; gross tonnage, 2,331; net tonnage, 1,998. She is fitted with patent steering apparatus, engine, wrecking pumps and patent riding stoppers for anchor chains. She will carry four anchors weighing 5,500, 5,000, 1,000 and 600 lbs., respectively. The Crary will be commanded by Capt. William H. Potter of Orient, L. I., who is the principal owner.

Charles Fletcher of Providence, R. I., is having a \$180,000 steam yacht built at the works of the Harlan & Hollingsworth Co., Wilmington, Del. The vessel is to be named Alvina. She was designed by A. S. Cheseborough of Bristol, and is 215 ft. long over all, 178 ft. on the water line, 26 ft. 8 in. beam and 11 ft. 6 in. draught. Twin-screw triple-expansion engines of 1,300 H. P. and two Scotch boilers will be provided. The speed is to be 14 knots and the coal capacity 178 tons.

No time has been lost on the new ship for the Maine Steamship Co. at Roach's ship yard, Chester, Pa. The order for the plates was given on Nov. 7 and three days later they were in the punch shop being fitted for the keel blocks. Keel blocks are now in place and active work on the keel has begun.

Capt. Charles Hatch of Biddeford is to have a schooner, 60 ft. long and to cost \$5,000 built by A. & M. Gamage & Co., at South Bristol, Me., this fall.

CONTRACT FOR NEW SUBMARINE BOAT.

A contract has just been executed between the navy department and the Holland Submarine Torpedo Boat Co. by which the latter agrees to build a new vessel in place of the submarine boat Plunger and to credit the government with the amount of money it had paid on the Plunger's construction. The new vessel is to be on the plans of the six submarine boats of the Holland type authorized by congress at its last session. It will be larger than the Plunger and a better vessel in every respect. The contract price for the Plunger was \$150,000, and of that amount 85 per cent. or \$127,500 had been paid by the government to the Holland company. No payments will be made to the Holland company on the new vessel until work representing the amount named has been done.

INCREASED TRANSPORTATION FACILITIES.

A PLEA FOR DEVELOPMENT OF OUR INLAND WATERWAYS, ESPECIALLY A SHIP-CANAL IN UNITED STATES TERRITORY FROM THE GREAT LAKES TO THE SEAS, IN ADVANCE OF TAKING UP A NICARAGUA OR PANAMA CANAL.

To the President, Congress and People of the United States: The tendency and universal demand of the world at the present time calls for increased transportation facilities. The giant locomotive and the car are the present ideal for the rapid haulage of finished products, but the large modern vessel, carrying from 10,000 to 20,000 tons, is the most economical means for transporting raw material and bulk freight for long distances. If the United States is to acquire and maintain the manufacturing and commercial supremacy of the world it must have both the most rapid and the most economical transportation, and will be compelled to follow the example set by Canada in the reconstruction of the Welland canal and the improvement of the St. Lawrence river, now the only available route for American ships from the great lakes to the oceans, and must immediately deepen and improve the great rivers and channels within the United States to form adequate modern ship waterways between the great lakes and the oceans.

Russia, Germany, France and other world powers, since the completion of their railroad systems, have recognized the supreme importance of economical transportation for raw materials, and the inadequacy of the railroads for this purpose, and have inaugurated great systems of modern ship canal construction and river improvement, in order to compete in the markets of the world. The British islands, penetrated by large rivers and surrounded by deep water, have the best natural water transportation facilities and the largest marine commerce in the world, yet the city of Manchester, England, alone, with a population of less than 500,000, although it had the best of railroad facilities, overcame great obstacles and devoted \$75,000,000 to the construction of a ship canal forty miles in length, giving it direct connection with the ocean, through Liverpool. The city of Manchester and the district adjacent to the canal, since its completion, have already greatly increased their business, population and wealth.

The returns to the city of Chicago and the adjacent district from the construction of the sanitary and ship canal, although the expenditure of money has been much less, will be correspondingly great when the canal is opened for navigation, and when this waterway is finally extended to the oceans it will be of incalculable benefit, not only to the United States, but also of great benefit to all nations. It is estimated that it will cost the United States from \$150,000,000 to \$500,000,000 to construct either the Nicaragua or Panama canals. The cost of maintaining and defending either of these canals will also be enormous. To complete the drainage and ship canal, improve the Illinois and Mississippi rivers so as to receive either the largest lake or ocean vessels, and form a connecting link between the great lakes and the Gulf of Mexico, will cost the United States but a small part of the cost of either of the above canals, and the cost of maintenance would be trifling as compared with the cost of maintaining or defending either the Nicaragua or Panama canals. The difference in the cost of an adequate waterway from the great lakes to the Gulf of Mexico and the cost of constructing, maintaining and defending either the Nicaragua or Panama canals, would leave a sum of money sufficient to construct equally large ship canals connecting the great lakes with the Hudson river and the Atlantic ocean, wholly within the United States.

The improvement of the Columbia river, the Missouri river and the Mississippi river, and the construction of a connecting ship canal between the Columbia and the Missouri rivers, adequate for the largest naval or merchant vessels, would be of far greater value to the United States than either the Nicaragua or Panama canals, or any other canal in a foreign country, and its cost of construction would probably be less than the cost of construction, maintenance and defense of either the Nicaragua or Panama canals. The construction, maintenance and defense of either the Nicaragua or Panama canals by and at the expense of the United States, before the development of the necessary internal water communications of the United States and the development of the merchant marine of the United States, would be a philanthropic act too great to be expected of even the most wealthy nation, as other nations with a more highly developed merchant marine would reap the greatest benefits and the United States would lose its opportunities and prestige, and other nations would be enriched at the expense of the people of the United States.

England and other foreign nations now transport more than 90 per cent. of the enormous exports and necessary imports of the United States which exceed those of any other nation. The people of the United States are commercial dependents of these foreign nations, and in time of war are especially at their mercy. The giant fleets of the United States on the great lakes are helplessly bottled up. The only outlet for these vessels of the United States from the great lakes to the ocean is under the control of and at the mercy of England, and even this outlet is only available for small vessels. Large vessels can only be transported through this outlet in sections, and must afterwards be reunited, as was the case with the United States revenue cutter Gresham during the Spanish war. It is deplorable that the greatest and wealthiest republic that ever existed should be so dependent and helpless. Commercial independence from foreign nations is as desirable for a great republic as political independence, and can only be acquired by the United States by the development of the merchant marine of the United States and its rapid substitution for foreign ships on the oceans.

The only and most rapid solution for the United States is to construct an adequate ship canal from the great lakes to the Gulf of Mexico or the Atlantic ocean, wholly within the United States. Then the present large vessels and fleets on the great lakes, now idle during the winter, will immediately and prosperously transport our foreign commerce. The additional ships that will be necessary to displace foreign vessels can then be rapidly and economically built, not only on the coast of the United States, but also on the great lakes, near the largest and purest iron ore and coal deposits on earth, and these new vessels can also immediately engage in our foreign commerce without asking the consent of any foreign nation, and establish the commercial freedom of the United States. The railroads of the United States would never have obtained their present state of development were it not for the land grants and fos-

tering care of the government in their infancy. From the beginning of railroad construction in the United States in 1830 to the present time, 190,000 miles have been constructed, 100,000 miles of which have been constructed during the last twenty years, and a large part of the old mileage has been reconstructed and improved during this brief time. Equally great results can be achieved in ship canal construction in the immediate future. The barge canals advocated by Washington a century ago to cross the Allegheny mountains were gigantic enterprises for the limited resources of his era. The construction of a ship canal, even across the Rocky mountains, is not too great an undertaking for the resources, wealth and genius of the people of the United States at the present time.

The people of the United States have performed and are capable of great and rapid achievements. From 1860 to 1865 they sacrificed 600,000 lives and \$4,000,000,000 for the principles of freedom and union. Only \$50,000,000 expended yearly for ten years by the government of the United States upon the great natural rivers, channels and connecting ship canals within the United States, will forever bind together all the states and the people of the United States into one great financial, industrial and commercial union, of mutual interest, more firm than any purely political union could possibly be. The Canadian government has recognized the fact that the ancient 200 to 300-ton barge canal is obsolete, and only builds modern ship canals, which the United States is now generously permitted to use in times of peace. The wisdom of our great statesmen will recognize the tendency of the times and the needs of the United States for improved inland transportation by water, and will solve this great problem at a per capita expense trifling compared with the necessary large per capita expenditures of Canada for this purpose, without injury to the railroads and to the infinite benefit of all of the people, industries and railroads of the United States, by the construction of large, modern and adequate ship canals and the improvement of all the great rivers of the United States on a large, comprehensive and harmonious plan, and give to the United States a supremacy in this direction which it has attained by the wise action of the government in developing our great railroad systems.

The largest part of the money expended upon the Nicaragua or Panama canals, or any other foreign canal, would necessarily go to foreigners, while the money expended for the improvement of the waterways within the United States would go back to the people of the United States, who pay for the improvements, would give healthful employment to American labor, and would develop the ingenuity, resources and wealth of all of the people of the United States. The problems and difficulties to be overcome in building a ship canal 30 ft. deep, entirely within the United States, are not greater than those for a similar waterway in Nicaragua or Panama. The United States has achieved great victories through the efficiency of the military officers and the bravery and patriotism of the soldiers at the service of its war department. The war department, through the corps of engineers, has rendered great service in the improvement of the rivers and harbors of the United States, and when supplied with the necessary funds will achieve correspondingly greater and more rapid results for the development of the inland water communications of the United States. After the United States has improved all its great rivers and constructed the necessary ship canals within its borders, equal to or greater in capacity than any proposed foreign canals to be built at the expense of the people of the United States, it will have, compared with other nations, unequalled facilities and resources, and will acquire and maintain the industrial, commercial, shipping and civilizing supremacy of the world. The United States will be the most highly developed and the wealthiest nation of the earth, and will be the most powerful factor in maintaining peace among nations and peacefully extending civilization, and will be enabled to further advance the progress, prosperity and ultimate unity of all mankind. The differences between nations will then be adjusted peaceably, as are now adjusted the differences between individuals, cities, counties, principalities and states. It may then be the high mission of the United States to also construct, maintain and defend either the Nicaragua or Panama canals, or some other ship canals in foreign territory, and generously grant to all nations equal privileges in the use thereof.

ALBERT H. SCHERZER.

Chicago, Nov. 20, 1900.

Mr. Scherzer is an engineer of national reputation. He is the inventor of the Scherzer rolling lift bridge, which is used by railroads and by municipalities in different parts of the country.—Editor.

LAUNCH OF MONITOR NEVADA.

The secretary of the navy has conferred the name Nevada on the coast defense monitor which was originally called in honor of the state of Connecticut. The Nevada was launched last Saturday at the ship yard of the Bath Iron Works, Bath, Me. Four monitors were authorized by the war congress in response to the demand for better coast protection and they were called the Arkansas, the Connecticut, the Florida and the Wyoming. Dissatisfaction was expressed by Connecticut people that their state should be represented in the navy by a small, non-seagoing vessel, while other states had big battleships named in their honor. When one of the new battleships was named Rhode Island the smoldering resentment of Connecticut broke forth into wrathful protest and the navy department, in response to representations from officers and prominent men of the Nutmeg state, cancelled the name bestowed on the monitor. The Nevada people are satisfied to have the monitor named for their state, the smallest in the union in point of population. Senator Stewart has informed the secretary of the navy that the state appreciates the honor. The Nevada is a single-turret monitor, designed expressly for harbor defense. The dimensions are as follows: Length, 252 ft.; beam, 50 ft.; draught, 12 ft. 6 in.; displacement, 3,234 tons. Its contract speed is required to be 11.5 knots. Its batteries will consist of two 12-in. breech-loading rifles, four 4-in. rapid-firing guns, three 6-pounders, and four 1-pounders.

If you contemplate a trip either west or east you can secure advantages not found elsewhere if you will write, wire, 'phone or call at the city office of the Nickel Plate road, 189 Superior street, 'phone main 218, or ticket agents Euclid avenue station, 'phone Doan 817. Rates and tickets, first or second-class, to any point authorized east or west at any station on the Nickel Plate road.

245, Dec. 31

LIGHTHOUSE KEEPER'S DAILY LIFE.

Louise Lyndon Sibley, in the Boston Transcript.

There is a day of praise for the life-saver. The big report of his year that spreads over the country the story of his perils and efforts adds up in fascinating columns the ships he helped or saved, and the people he brought ashore. But there is no annual glory for the light-keeper, nor thrilling title, nor in all grades a badge of instant identification like the band on the life-saver's cap, that carries after it the landsman's stare whenever he comes to town. The government merely requires him to lose his life for his light, if need be, and pays him for taking the chance to do so. The board considers that it is the duty of every light-keeper to stand by his light as long as the light-house stands; and that for him to desert it is as cowardly as for a soldier to leave his guns on the advance of an enemy. His failure to keep his light burning, especially in time of danger, may cause the wreck of vessels looking for it and result in the loss of much property and many lives. And after all, the light-keeper has nothing to show for his fidelity but lists of passing vessels that his fine, shining light helped to keep afloat—those 3,268 steamers, twelve ships, forty-five barques, eight brigs and 7,980 schooners, for instance, that passed his particular station in a year.

The very names of some of his stations bring desolation and isolation and deprivation—Minot's Ledge, Half-way rock, Montauk point, Gay Head, Stannard rock, Boon island, Southwest shoals, with rips and races and reefs besides, open to all the year's winds and with sea and sand piling up between tower and the civilized world beyond. But wherever you might look off from shore at light-houses, near or far, you would find a steady light in each one from sundown to sun up as surely as the stars rise in the sky behind it. Several towers in sight at once would show lights at the same instant as though there were some agreement between the keepers. And you may be sure that the St. Croix riverman would be hanging up his United States lantern on the United States tree at that very minute also, and that the big glass and brass mechanism at Minot's would most surely be beginning to count 143.

You know that those keepers are alone with their families or assistants out there, and far away from daily direction or control from any superior. Yet it is evidently arranged and provided for that each separate unit in the great coastwise chain of lights can and shall do his work well, even if he does not leave his station for months, nor see any person besides those at the station with him, nor any other light of the whole chain. He really knows very little about the "chain" or the "system," and he never thinks of Washington. He has a "light" to keep and one superior to report to, and once wound up to his duties it is not unusual for him to keep at them till some great break in his life disconnects the machinery and sets him down ashore once more. He accepts the responsibility and the incidental privations when he takes the oath of office, and he expects no praise for his mighty toil any more than sailors do at sea, who work daily miracles with boats and ropes as a matter of course.

The familiar type of New England light-keeper is not, however, the one who lives at the end of a yachting cruise, visited up a ladder and interesting to look at because he may have gone hungry in heavy weather. The everyday type lives all along the shore at charming little stations with gardens and a cow, here on a beach, there on a bluff, or on a tight little island all his own, where he reigns as kindly king, or chases people off like Tom Tiddler. Incidentally he wears a misfit halo brought from far inland by enthusiastic summer people and made Grace Darling's size, or the Eddystone's. The tourist sits up late on deck, going home in the fall, to match up all the lights with the guidebook list, and to sentimentalize on the value of all these guides to the poor sailors. He is an imaginative tourist indeed if he can lay his own safe keeping to their beneficent presence or trace the preservation of his trunk to so remote a blessing. But even if he should hurrah for the keeper at the moment the steamer plunged safely past a light-house ledge, there might be a mistake. This was the night, in fact, that the small daughter of the house had climbed the two hundred echoing steps of the tower in the howling wind to tend the light, since "father" was down with a sick headache.

The light-keeper, as a "romantic fact," appeals vaguely and pleasantly to everybody, and no one's unaided fancy can easily reach the 4,000 romantic facts scattered along the coasts. Their story in full, is out of common sight and entirely outside common query. If you could look in at some little offshore light, just after lighting-up time, you would see the keeper clear the table of his solitary supper dishes and spread out before him various log-books and perhaps blank forms also, that he would fill out and file away. He would make entries in his log-book about the weather and the wind and his work. He would say when his assistant left the tower, and how much wicking and oil had been "expended" that day. So many lines for this, and so many lines for that, he could hardly fall into the wrong pen-hole if he tried, and, truth to tell, all this work of recording is a puffing task to the unaccustomed writer. Kindly black lines and printed capitals guide his clumsy hand along the recognized and required path of courtesy, for this lonely little man in his "gusty creaking tower" is making out his "reports" to his chief, who has his head in keeping. The nervous signature, the prancing, bold-footed address across the treasury envelope, and all is done. Then tomorrow he will button it inside his undershirt, and pile oilskins over it, and go pitching across rough seas to the land, to fish it out at the village post office, and drop it warm and dry into the mail box. Then the precious work of his hand will be whisked away to the office of the chief at some nearby city in company with hundreds of similar works to be sorted and sifted and filed and passed upon.

The tell-tale light does the rest. If he lets it fail the little local world at sea and on shore cry out in distress, and take care that he is reported in a hurry. And those ever-present other men who "want that light" would magnify and falsify and fairly bury him in judgments. The inspector to whose care and command the little man is committed by his place on the map is more to him than his own grandfather, and more than any variety of president. A light-keeper, shut away from the world, may be excused for not knowing always just who is president, but the change of inspector every three years he follows with anxious eagerness. Every three months the great man, "commander" someone, comes round to hold a little dress parade for the keeper and sign the book to indicate whether the keeper may still wear his head. The whistle of the inspec-

tor's boat, the "light-house" pennant flying, sends the light-keeper jumping into his blue uniform with brass buttons, and everyone knows how sudden and disastrous the call may be who knows Mrs. Crowninshield's story of the bad little son of the light-house who hid pop's galluses just as the "old man's" boat hove in sight. The names of some of the inspectors are fresh in the memory of older light-keepers, who once "shook hands" and remember and brag of it now, with Dewey, or Schley, or Phillips, or Dyer, or Green, or Colby, or Selfridge, or Wilde, or Barker. They can delightfully lose sight of the glint of irony in the situation—the fact that the only man they see all winter, perhaps, in the twenty miles off shore light is the man who comes to find fault if he can, for the best good of the service. The visit of the inspector is far and away the chief event of the quarter at most light-houses. It is talked over in the light-house kitchen inch by inch and word by word, and then, as weather permits, exchanged in talk with other kitchens. What he said to Brown, what he did to Jones, and most racy of all, what Robinson said back.

The overworked, underpaid light-keeper, whoever he is, and wherever he may live, has two things to keep him true to his oath in those long months between the inspector's visits—first and least, his fear of dismissal if anything goes wrong with his light; second and strongest, an almost automatic perception of the life-saving side of his work. Few keepers, however slack and ignorant, fail to feel the prick of responsibility. Most of them have had some seafaring experience and can look at the light with sailors' eyes. And it is everywhere true that all the keeper's family "keep the light" with him, although not sharing in the pay, as English wives and children did in Grace Darling days. The very best keeper may "lose" his light, as they say of temporary obscurity. A break-down in the machinery, a succession of bad chimneys, a duck flying through the plate-glass of the lantern, may naturally darken the light for an instant, but it is required that the light-keeper shall be so full of expedients and resources and so handy and well prepared that he will save both his presence of mind and the beacon itself. He will hurry up to hang a lantern in a seaward pane, or substitute his supper table lamp for the disabled one in the tower, and nail up the broken window briskly. If it is the revolving apparatus that fails, then he must sit down at once and turn, and turn, and turn it by hand all night. Everything must look just the same as usual at sea. Thomas Jefferson said: "Keepers should be dismissed for small degrees of remissness because of the calamities which even these produce."

But Jefferson would rejoice over those reams of written reports that light-keepers have turned in since then, formally describing every degree of unremissness, recording briefly faithful services performed with grit and daring and denial, all that never became history, tradition nor story. However, a man who can be brave on occasion may be personally lazy and need the spur of the inspector's visit to keep him up to "efficient, uniform and economical" use of stores and grace of deportment. If a man is naturally neat and industrious, as many sailor light-keepers are, the inspector's visit is merely a pleasant episode. If he has let things run down much or little he will scramble to make good, to rub up his brass-work especially and to put untidiness out of sight, which seldom succeeds in deceiving. The inspector looks behind the shiny front of things, and behind the doors; he walks upstairs, and down through the kitchen, opens closets, examines sinks, stores, drains and out-buildings. He expects and requires man-o-war neatness and order. Really keeping the station in perfect order means in many instances what an old keeper quaintly called "working all day for the privilege of working all night." But duties necessarily vary. A tower 200 ft. high is harder to paint and to polish and to climb up to than Ida Lewis's little watch-house just outside her parlor door. But there is nothing in the service left to a keeper's own choice in work. No room for the hurry-up man who would waste oil lighting his lamp by early in the afternoon, nor for the happy-go-lucky who wouldn't light his till a few lives had been possibly lost. The "Instructions to Keepers," which is the only kind of bible provided, tells a man when and where and how to do everything about his station. And it grew out of the occasion some fifty years ago when it was discovered that keepers were running their government lights to suit their private convenience very much like the very early English keeper who hired an old lady a mile away to snuff the candles for him, who couldn't "go so far" on stormy nights, it appeared after sundry wrecks. The regulations, the similarity of apparatus everywhere, the inspectors diligently making their quarterly visits, the light-house board inspecting the inspectors, and the government behind the board, all work together to produce the marvel of concord and order called the "Light-house system."

If you think it would be jolly to have one of those pretty little summer holiday lights to keep, there is nothing more to do towards it than to put your name down as candidate, backed with goodly recommendations. That is, if you are over eighteen and under fifty, and can handle a boat, and write, and keep accounts and whitewash a fence. Then your name will stand at the end of a long list of more desirable applicants than yourself, men who have seen some previous light-house service or sea service, sons of keepers, retired sea captains and the like, who always had a good first chance, as well as old soldiers from anywhere who also have an honorable precedence. And if your name did come back favorably considered from Washington, you could go on three months' trial at some light-house, not of your own choosing, to see if you were fit to keep. If so, and you could pass the civil service examination at the inspectors' hands, you might, finally, become through the secretary of the treasury, a full-fledged "third assistant" and begin to work under a head keeper at \$420 a year. By a series of transfers and promotions the pretty little light and its \$600 a year might become possible, if to all your other excellences you had added a wife and family. They give the pretty stations requiring only one keeper to married men. But vacancies are not common in New England, and only years of consecutive service could bring any hope of change.

The New England light-keeper generally "belongs" near the light he keeps and has worked up to it through various patient promotions. Occasionally a keeper on duty dies; occasionally one is removed or resigns, and the establishment of a new station always starts a wave of change through certain grades. But a keeper who has reached the top generally prefers to stay at his familiar station, even refusing the offer of a "better" light. And the longer he stays the more entirely he unfits

himself for any other kind of work. His sub-consciousness, unrolled, would be calendars, and tides, and the compass, miles of sunsets and sunrises, wide calms, big storms, salt wind, boats, oil, paint and provisions. His day of hours is not at all the day they have on shore, and his consequent habits and customs belong to his kind of life alone. The tower might be rebuilt, the house replaced, and even the face of the map might change, but the wonted keeper would go climbing up to kindle his light at nightfall. "For forty years," the old keeper at Ipswich says. Yet there is no pension ready for the worn-out keeper, no public recognition beyond newspaper stories, no honors, no reward, no perquisite. But he gets his fixed amount of pay as surely as pay-day comes round. And he is assured his position while he shows himself capable. He can be discharged for specified written and recorded cause, but never for political reasons. If he has to share his tower or his station with other keepers and their families, they may make a happy nestful or pass their days in contention. The government annually improves the situation for many of them, but there are still a great many stations on the list that need a separate dwelling or apartment for one or more of the keepers, to save crowding and inconvenience and quarrels. The head keeper does not always cheerfully take to his bosom and "board" the stranger assistant set down suddenly at his door. There are keepers on mere footholds of rock at sea who hold no intercourse with their assistants, and, worst of all, whose wives do not "speak."

A generous freedom for the day is allowed every keeper. The rules of the service bind him only to his care of the light and station, and if it is an easy position, as many are, the keeper is free to use his spare time as he likes. He may follow any small industry at the station, or work at his trade. One keeper in a little spider-legged tower off shore makes boot-heels. Another engraves coffin-plates. Some sell vegetables and eggs and milk. Some hunt game-birds that sell well. Others make clothes, or build boats, or stuff chairs, or mount birds. The women of the keeper's family sometimes do a little business with pressed seaweed and polished shells in the souvenir line. And there are keepers who teach school, and those who preach. The government aims to make the keeper's position pleasant enough to keep him contented. A satisfied, capable man is the kind of keeper desired at every station. They even give him good books to read, but they never interfere with his soul. He may go to church if there is one handy, but if there is not, he is not told, as the English keepers are, "to perform the service pointed out for them by reading a portion of the scripture, and any other religious book furnished by the board," nor diligently urged to say on Sundays, "the prayer composed for their use by Rev. Dr. Brunton, or other prayers in any work furnished by the board."

UNITED STATES AS AN EXPORTER.

INCREASE OF \$166,000,000 IN TEN MONTHS OF 1900, COMPARED WITH THE SAME PERIODS OF 1899—INTERESTING TABLE SHOWING HOW THE TIDE OF EXPORTS HAS TURNED IN OUR FAVOR, ESPECIALLY DURING THE PAST TEN YEARS.

There is ample food for Thanksgiving reflections in some figures which the treasury bureau of statistics has just presented regarding the commerce and affairs of the United States in these closing months of the year 1900, as compared with conditions at the corresponding date in preceding years, and comparing prosperity in the United States with that in other countries. While the whole world is prosperous the United States seems to be especially so. Our exports show an increase of \$166,331,178 in the ten months ending with October, 1900, as compared with the corresponding ten months of 1899, and the total for the ten months is practically double what it was in the corresponding months of 1894. This of itself shows a remarkable activity in all lines of production, while the import as well as the export figures indicate that the activity in manufacturing lines, and consequently the increased earnings of the millions engaged in these industries must be very great. A very considerable share of the materials required for use in manufacturing comes from abroad, such for instance as India rubber, tin for use in manufacturing tin plate, hemp, jute, sisal, raw silk, cabinet and dyewoods, chemicals, hides and skins and certain grades of wool and cotton; and by measuring the growth in the importation of these articles some idea of the growth in manufacturing may be obtained.

The total importation of materials of this class used in manufacturing during the ten months ending with October, 1900, is \$238,257,918, as compared with \$214,396,757 in the corresponding months of 1899 and \$127,301,945 in the same months of 1894. Turning again to the export side, it is found that the exportation of manufactures alone amount, in the nine months ending with September, 1900, to \$338,678,243, against \$277,502,649 in the corresponding months of 1899, and \$145,793,834 in the same months of 1895. Thus the exportation of manufactures has increased nearly 25 per cent. in one year and more than doubled in the four years from 1896 to 1900, while the importation of manufacturers' materials has also increased at a very rapid rate. Exports of manufactures of iron and steel alone amount to \$110,000,000 in round numbers in the ten months ending with October, 1900, against \$86,000,000 in the corresponding months of 1899 and \$51,000,000 in the corresponding months of 1897, thus having more than doubled in the three years from 1897 to 1900.

Not only have the manufacturer and the millions dependent upon his industry shared in the prosperity of the year, but those engaged in agriculture and mining seem to have been equally prosperous, judging from the record shown by the figures of our export commerce. The exportation of agricultural products in the ten months ending with October, 1900, is in round terms \$700,000,000, as against \$625,000,000 in the same months of 1899, while the products of the mine, the forest, and the fisheries also show an increase in 1900 as compared with the figures of 1899. This increase in the products of industry is especially interesting in the fact that in many cases it shows a higher reward for a given quantity of labor, or, in other words, higher prices received for the article itself as well as an increase in the quantity produced and sold. In cotton, for instance, the average export price per pound in the months of September and October, the beginning of the new cotton year, has been 9.9 cents against 6.7 cents in the same months of the preceding year, while in

other agricultural productions and in various lines of manufactures, especially those of iron and steel, and in the products of the mine, there are increased prices per unit of quantity, and thus better earnings for those who produce them.

A comparison of conditions in the United States with those in other countries, as measured by the foreign commerce, indicates a degree of prosperity which compares favorably with any country of the world. Our own exports for the ten months ending with October show an increase, as has already been noted, of \$166,000,000, while in the exports of the United Kingdom the increase in ten months is \$125,000,000. The 1900 figures for Belgium, France, Spain and Italy show no increase in exportations during that part of the year 1900 whose record is now available. In the case of Belgium, France, Spain, Italy, Germany and the United Kingdom, the imports are greater than the exports; while in our own case the exports vastly exceed the imports, the excess of exports over imports in the ten months ending with October being \$499,667,936, or a greater excess than in the corresponding period of any preceding year and a greater excess than that of any other country in the world.

It is not improper in this review of the commerce of the year 1900 and comparison with preceding years to also briefly review the decade and century of which it forms the closing year. While it is not practicable, of course, to give the total import and export figures for the calendar year 1900, the bureau of statistics has completed the figures of the fiscal year 1900 ending with June 30, and thus made it practicable to compare the commerce of the fiscal year with preceding fiscal years running back to the beginning of the present form of government. This table, which shows the imports and exports and excess of imports or exports in each year from 1790 to 1900, is too long to reproduce in full, but it has been further condensed by the bureau into a table showing the imports and exports in ten-year periods from 1790 to 1900, with the excess of imports or exports in each decennial period. This table is interesting not alone in its presentation of the import and export record, but especially in its showing relative to the excess of imports or exports during the 110 years under consideration. It will be seen by an examination of the final column of the table, which is presented below, that imports exceeded exports almost continuously prior to the decade 1871-80, and that since that time exports have almost continuously exceeded imports, but that the excess of exports over imports in the decade just ending, 1891-1900, is extremely large as compared with any preceding decade, while, as already shown, the excess of exports over imports in the single year 1900 will also be greater than in any preceding year in our history. The table showing the commerce of the United States by decennial periods is as follows:

Ten-year periods.	Imports.	Exports.	Excess of imports or exports.
1790-1800.....	\$ 614,845,454	\$ 487,947,512	\$ 126,897,942
1801-1810.....	927,663,510	745,315,061	182,348,449
1811-1820.....	808,119,274	589,892,223	218,227,049
1821-1830.....	729,488,785	694,310,237	35,178,548
1831-1840.....	1,195,206,786	1,035,502,010	159,704,776
1841-1850.....	1,180,947,790	1,195,549,357	14,601,567
1851-1860.....	2,844,750,360	2,488,874,604	355,875,758
1861-1870.....	3,318,670,286	2,543,264,099	775,406,187
1871-1880.....	5,352,215,118	5,893,007,193	540,792,075
1881-1890.....	6,921,865,217	7,651,354,976	729,489,759
1891-1900.....	7,632,052,066	10,248,395,386	2,615,343,320
Total.....	\$31,526,824,646	\$33,573,412,658	
Net excess of exports, 1790 to 1900.....			\$2,046,588,012

DEATH OF THOMAS WOOLSON YARDLEY.

Col. Thomas Woolson Yardley, well known in iron and steel circles, died last week at the home of his cousin, Capt. Robert W. Hunt, Chicago. Capt. Yardley was seventy-five years old. He went to Chicago in 1888 as the head of the cast iron pipe department of the firm of Robert W. Hunt & Co., which position he held at the time of his death. He had been in the iron and steel business since he was eighteen years old. He was born April 23, 1826, in Bucks county, Pennsylvania. His ancestors were Quakers who had come over with William Penn and settled in that state. He was principal partner in the firm of John Burnish & Co., proprietors of the Pottsville Rolling Mills, and later he built the rolling mills of the Elmira Mill Co. at Elmira, N. Y. During the war he was connected with the department of military railroads under Gen. Callum, with the rank of colonel. Under his direction a rolling mill was built for the government at Chattanooga, Tenn., for the purpose of rolling rails to repair the destroyed railroad property of the south for the furtherance of military operations. After the close of the war Col. Yardley was engaged with Gen. W. W. Wright on the survey of the Kansas Pacific railroad, which later became part of the Union Pacific system. He was then connected with the Gaylord Cast Iron Pipe Co. of Cincinnati and Newport, Ky. In 1884 he was made purchasing agent of the Troy Steel & Iron Co. of Troy, N. Y., and from there went to Chicago. Col. Yardley was never married. For the past sixteen years he had resided with his cousin, Robert W. Hunt.

Prof. Peabody of the United States board of life-saving appliances, and who is also at the head of the department of naval architecture in the Boston School of Technology, will give a series of twelve lectures in different parts of New England, beginning Dec. 2, on the gas engine for marine purposes. He will use for illustrating his lectures a 1 H.P. "Superior" engine manufactured by the Lake Shore Engine Works, Marquette, Mich.

The board of directors of the Pacific Mail Steamship Co. met in New York last week and elected Charles H. Tweed, James Speyer and Ogden Mills members of the board in place of George J. Gould, Samuel Thomas and Henry Hart, resigned. Mr. Tweed was elected president of the company. Mr. Schwerin remains vice president and general manager, with headquarters in San Francisco.

Lindon W. Bates, the American hydraulic engineer, has been asked to undertake the widening of the Suez canal. He will leave London for the Mediterranean in a few days at the canal company's invitation, which bears the indorsement of the British colonial office.

MARINE REVIEW

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Now for the shipping bill. Senators and representatives must gird their loins and buckle on their armor, for the fight is on. It is idle to think that the shipping bill interests a few. It interests everyone. If any evidence were needed to corroborate this statement it would only be necessary to point to the fact that two great meetings, one held in Chicago and the other in Philadelphia last Saturday night, were devoted almost exclusively to the consideration of this bill. The meetings were not political. They were catholic in their character and yet the shipping bill was the principal topic discussed. The principal speaker at the Philadelphia meeting was Henry Cabot Lodge. In his speech Senator Lodge pointed out that the people have voted to maintain the protective system and to have the same policy extended to the upbuilding of the merchant marine. President McKinley on the same occasion also declared that the result of the election "records the unquestioned indorsement of industrial independence, broader markets and commercial expansion." The shipping bill was a part of the Republican platform. It was upon the platform of protection to shipping, as to other industries, that the Republican ticket was elected. That is the pledge which the party, dominant in all branches, should carry out. Foreign shipping is the only great industry in the country which is conducted on a free trade basis. What is the result? It has been declining year after year until it is almost wiped out of existence. There are only enough American ships to carry 9 per cent. of our exports. Ninety-one per cent. of all we make is waiting for the construction of American ships to carry it. At present all this immense income goes to Great Britain. We can make the goods but we are deprived of the profit on their carriage. The present policy is one of saving at the spigot and wasting at the bung-hole. Is it not time to awaken? Several patriotic Americans have undertaken to enter the foreign carrying trade against the handicap of Europe in the hope that the government, through favorable legislation, will come to their rescue. Congress should not desert them. Let the shipping bill be passed at the forthcoming session. It is in admirable form at present, so that no time need be lost in its preparation.

Probably no one thing of recent times has done so much to direct European attention to the ship yards of America as the remarkable performance of the Variag. The fact that this cruiser could be driven through the water at a greater speed than an ocean liner has ever attained has created no end of comment. Discussing the subject, a Russian official said:

"I firmly believe that Russia will come to America for swift cruisers. She may never build battleships again in foreign countries, because she is fast equipping ship yards capable of constructing them. The present naval program alone includes five ships as great as the Retvizan, and this means an expenditure of about \$25,000,000. The magnificent performance of the Variag, her reasonable cost and the short time in which she was built are the great factors in keeping Russian eyes riveted on the United States in the matter of swift cruisers. No navy can be complete without a plentiful supply of vessels of this type, and since Russia does not propose being behind in anything she will surely seek more ships of the type of this swiftest of all fighting vessels."

Russia has just arranged for the construction of five battleships included in the latest naval program. Two of them are to be built in government yards and three in private yards in Russia.

The comparative, one might almost say absolute, security of ocean travel could not be better illustrated than in the latest trips of the Atlantic liners. A storm raged, the fierceness of which passes all memory, and yet every ship came in. They were late, of course, all of them, but they came in. Everyone of them had been battered with countless tons of water, hurled with immeasurable force, and time and again the mighty liners were tossed like corks upon the waves. But they conquered triumphantly. Fastenings were torn from the decks and even propeller blades were lost but they plowed steadily forward. There was a diminution of speed but they went on. That wonderful machine, the essence of power, known as the Atlantic liner, is superior to the tempest. The mind of man subdues, if not directs, the elements.

An illustration of the launch of the monitor Arkansas, which appeared in the last issue of the Review, was made from a photograph furnished by Samuel E. Rusk of Newport News. It was an oversight that credit was not given when the picture was published.

TO SEND SHIPS TO THE SEABOARD IN THREE PARTS.

General Manager James Wallace of the American Ship Building Co. says that officials of the company are now considering plans of a type of very large vessel for salt water service that would be built on the lakes in three parts so as to admit of its passage through the St. Lawrence canals. This kind of freighter, alike to the vessel that would be built in two parts, would, of course, be put together at Montreal. Mr. Wallace is of the opinion that if the shipping bill is passed, lake ship yards would find opportunity to build at a profit quite a large number of vessels in this way. In any event, he says, the lake yards will have considerable to do in building vessels of St. Lawrence canal dimensions for Atlantic coast trade if the stocks are not refilled with lake orders in the spring. It is the intention of the International Transportation Co., owners of the steamers Paraguay and Asuncion, which have just gone to the coast, to build on the lakes a large fleet of such vessels, the keels to be put down as soon as places are found for them. Mr. Wallace and President W. L. Brown of the consolidated lake yards are interested with Mr. A. B. Wolvin and others in the International company. The Paraguay has reached the works of the Eastern Ship Building Co., New London, Conn., where she is being equipped for Atlantic coast service. The Asuncion will also be fitted out at the New London works. These vessels will engage in the general coastwise trade and in trade with Cuba, Porto Rico and South America.

The steel passenger steamer to be built by the Craig Ship Building Co. for the Holland & Chicago line will be ready early in the spring and will be 240 ft. in length and 40 ft. beam. The engines will be triple-expansion, with cylinders 21, 34 and 58 in. in diameter, with a stroke of 40 in. Steam will be provided by four Roberts water tube boilers, and this equipment will give the boat a speed of 18 miles an hour, it is believed. The cabin arrangements will be elaborate, and the capacity of the staterooms will be 200 persons.

Details connected with the consolidation of the two Buffalo ship building and dry dock plants, now owned by the American Ship Building Co., have been fully arranged, with Mr. Edward Gaskin as manager and Wm. Watterson as superintendent. The American company now has at Buffalo four dry docks, one 487 ft. long, two 350 ft. long and one 300 ft. long. The Lehigh Valley liner Wilkesbarre, built at the Union works, will be launched on Dec. 1. As soon as she is in the water the keel for the Mauch Chunk, a sister ship, will be laid. It is said that a new 400-ft. steamer will follow for the Union Transit Co.

TWO BATTLESHIPS AND TWO ARMORED CRUISERS.

THAT IS THE EXTENT OF THE NEW NAVAL PROGRAM—SIX LIGHT DRAUGHT GUNBOATS WOULD ALSO BE DESIRABLE—SECRETARY LONG'S ANNUAL REPORT.

Secretary Long's annual report was made public on Tuesday. As foreshadowed in the Review only a modest naval program is submitted to congress. Congress will be asked for only two battleships and two armored cruisers. The report says:

"The general board, of which the admiral of the navy is president, recommend the following increase of the navy: Battleships, two; armored cruisers, two; gunboats, six; destroyers, two; torpedo boats, three; transport, one; training ships, two. Four of the five members of the board on construction recommend: Unsheathed battleships of about 13,500 tons trial displacement, three; unsheathed armored cruisers of about 13,000 tons trial displacement, two; sheathed and coppered cruisers of about 2,000 tons trial displacement, six; sheathed and coppered gunboats of about 600 tons trial displacement, six; sheathed and coppered light-draught gunboats of about 200 tons trial displacement, ten; colliers of about 14,500 tons displacement, three; repair ship of about 7,500 tons displacement, one; transport of about 7,000 tons displacement, one. The fifth member recommends: Sheathed and coppered battleships of about 14,000 tons trial displacement and 19 knots trial speed, two; sheathed and coppered armored cruisers of about 14,000 tons trial displacement and 22 knots trial speed, two; sheathed and coppered protected cruisers of about 12,500 tons trial displacement and not less than 24 knots trial speed, two; light-draught gunboats, specially designed for river service, of about 600 tons trial displacement and 10 knots trial speed, twelve.

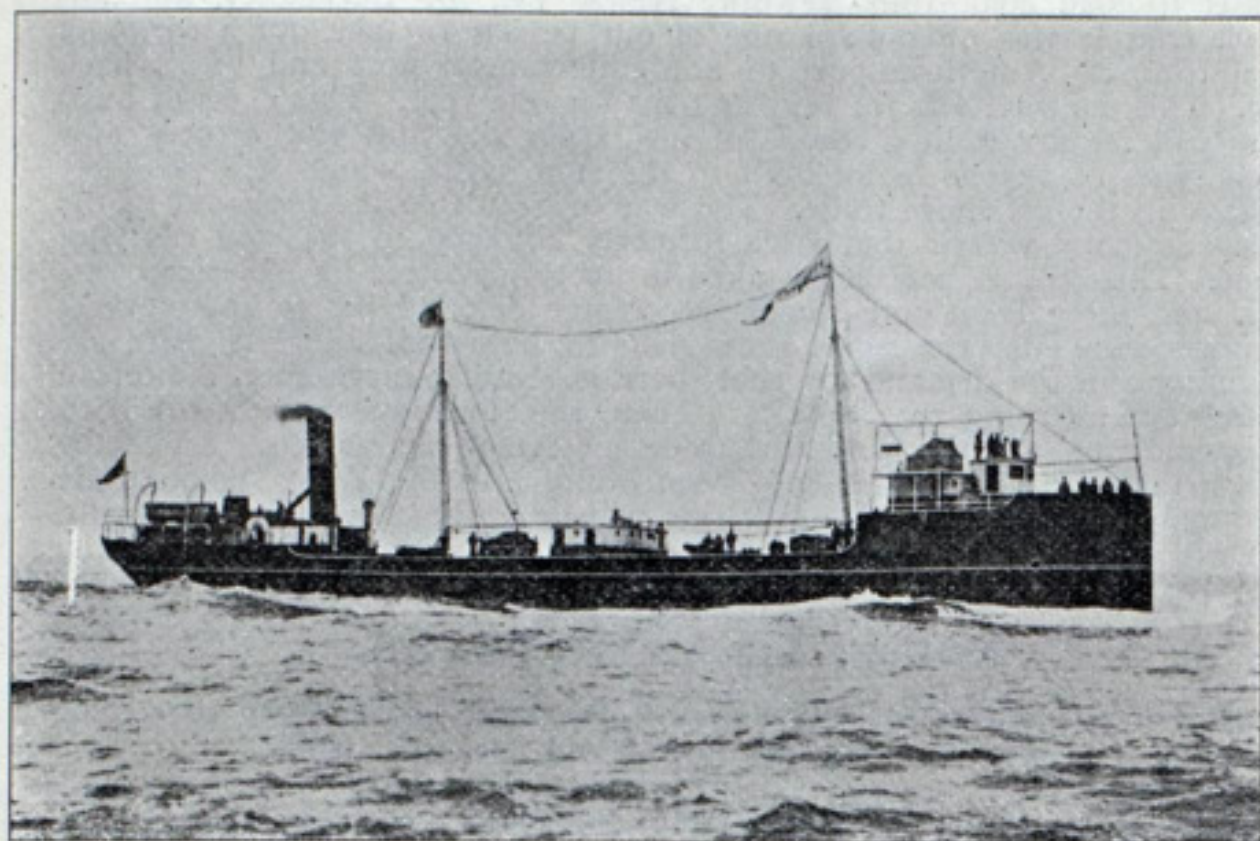
"All the vessels thus recommended are desirable in the prospective development of our naval force. But in view of the number of large fighting vessels already authorized, some of them hardly begun, the department is of opinion that congress at its coming session should be asked for only two battleships and two armored cruisers, all of the maximum displacement specified; that at least six light-draught gunboats and some small craft for river service are especially desirable in connection with our insular service, and that the colliers, training ships, transport and repair ship are the necessary accompaniment of the general recent increase of the navy, both in its fighting force and in the enlarged range of its operations. The department therefore makes its recommendation in accordance with this opinion.

Ship owners and ship builders buy paint in large quantities. Painting is going on all the time aboard vessels. The National Lead Co., with its very large business in lead and oil, employs, in addition to its branch-office service, special agents to look after leading industries, such as the shipping of the great lakes. Mr. D. E. Lynn, who represents the National company on the lakes, says that the managers of the big lines of freight carriers, such as the Bessemer and Carnegie fleets, have gone so thoroughly into the question of paints, on account of their large purchases, that there is no longer any question among them as to the value of using lead and oil as against mixed paints. Argument on this score is not needed now, he says, to the extent that it was some time ago. The National company is selling continually through ship chandlers and direct to the vessel owners tons of lead and oil on the lakes.

The Pusey & Jones Co., Wilmington, Del., has contracted to build a fine pleasure yacht 126 ft. long and 18 ft. molded beam for Charles J. Canfield of New Castle.

ENGLISH-BUILT VESSELS FOR SERVICE ON THE GREAT LAKES.

The ship building yards of the great lakes are not only building vessels for ocean service, but English yards are building vessels for great lakes service—ergo what is sauce for the goose is sauce for the gander. Of course, the English-built ships are for Canadian owners. Two of these have already been built—one, the *Strathcona*, from the yards of W. B. Thompson, Dundee, Scotland, having been engaged in the lake trade for a part of the season now drawing to a close. The second, the *Donnacona*, built by Wood, Skinner & Co., Bill Quay-on-Tyne, has just had its trial trip. As will be seen in the accompanying illustration, the *Donnacona* is of the lake type, with machinery aft. The peculiar appearance of the vessel created considerable interest on the Tyne, but on the lakes



STEAMER DONNACONA, BUILT IN ENGLAND FOR SERVICE ON THE GREAT LAKES.

she would be unobserved among her innumerable kin. Alike to the *Strathcona*, she was constructed for R. O. & A. B. McKay, Hamilton, Ont. She is classed with the British Registry of Shipping and is 255 ft. long, 42 ft. 6 in. beam and 23 ft. 8 in. deep. She is of Welland canal size and is designed to carry 2,650 tons on a draught of 16 ft. 5 in. She has triple-expansion engines of 1,000 I.H.P. and is expected to maintain a speed of nearly 10 knots. She will enter the coal, grain and ore trade on the great lakes for Canadian account. During the present winter she will be employed in the European trade. After her trial trip the *Donnacona* proceeded on her first voyage to Barcelona with a cargo of coal.

The *Strathcona* is 245 ft. keel, 42 ft. 6 in. beam and 23 ft. 8 in. depth. Her tonnage is 1,881 gross and 1,465 net. Engines are triple-expansion with cylinders of 18, 30 and 50 in. diameter and a common stroke of 36 in. The horse power is about 650. There is one Scotch boiler of 15 ft. 6 in. diameter and 11 ft. length. The steam pressure allowed is 180 lbs. Three furnaces have 66 sq. ft. of grate surface and 2,133 sq. ft. of heating surface.

LAUNCH OF TORPEDO BOATS BLAKELY AND DE LONG.

On Thursday last the torpedo boat *Blakely*, which, with the *De Long* of equal dimensions and identical equipment, has been under construction at the works of George Lawley & Sons Corporation, South Boston, was launched in the presence of an immense crowd. It was the intention to launch the *De Long* too, but while the *Blakely* was being towed to a convenient docking place the wind shifted and caused the water at the Lawley yard to recede to such a degree that the actual launching of the *De Long* was postponed until Friday. However, the formality of christening the boat was gone through. These boats are two of eight torpedo boats ordered by the United States government in the fall of 1898. Each contracting firm was given two years in which to complete the work of building each boat. Three torpedo boats have been built in Massachusetts, the George Lawley & Son Corporation of South Boston securing the contracts for the construction of two. The contract called for boats of 165 tons displacement, with a speed of 26 knots. The normal length of each boat on the water line is 175 ft., breadth at load water line 17 ft., displacement in tons (normal draught) about 165 tons. The hulls are built, launched, fitted and made complete in all respects, with conning towers, cabin, wardroom, storerooms and all other rooms necessary. They are complete steel hulls, all material conforming with the requirements of the navy department. The flat keel plates are of one thickness of plate, 10 lbs. per square foot for a length of about 100 ft. amidships; forward and aft of this length the plate is reduced to 7½ lbs. per square foot. The vertical keels are made of steel plate, 15 lbs. per square foot; in depth 8 in., secured to the flat keel by angle bars. The deck beams are spaced 18 in. between centers, so as to have a crown of 10 in. in the full breadth. The framing over that part of the deck above the boilers is arranged so as to allow the free passage of boilers and machinery to their seating, with but little displacement to the deck plating. The plating of the turtlebacks is 4 lbs. to the square foot for the portion worked in the round of the beams, the balance being 3½ lbs. per square foot. The bulwark plating aft of the turtlebacks is 4 lbs. to the square foot. To guard against accidents the vessels are each provided with steam and two sets of hand steering apparatus. Particular attention is paid to ventilation and drainage.

Torpedoes will be stowed, one in each tube. The spare torpedoes will be stowed in cradles under the turtlebacks. The conning towers are of the usual shape and dimensions. The forward ones are of nickel steel plates, 20 lbs. per square foot, of not less than 3½ per cent. nickel, with a tensile strength of at least 90,000 lbs. per square inch, and an elongation not less than 15 per cent. in 8 in. Improved torpedo cranes and appurtenances are in position with crane socket for each torpedo emplacement, with all necessary trolley rails, switches, trolleys and hoists.

The propelling engines are of the vertical, inverted cylinder, direct-

acting, triple-expansion type, each with a high pressure piston, 14 in. in diameter, an intermediate pressure piston 22 in. in diameter, and two low pressure pistons each 25¼ in. in diameter, the stroke of all pistons being 18 in. The indicated horse power of the propelling engines will be about 3,000 when the engines are making about 350 revolutions per minute. The propelling engines are placed in separate water tight compartments, with the high pressure cylinders forward and the low pressure cylinders aft. The main engines are balanced in an approved manner. The crank shafts are hollow and made in one section. The shafts, piston rods, connecting rods, valve rods, eccentric rods and general working parts are made of forged nickel steel. There are two condensers to each boat, made entirely of composition and sheet brass. Each has a cooling surface of about 1,240 sq. ft. and measures on the outside of the tubes the water passing through. For each main engine there is one double-acting pump, driven from the main engine shaft. The circulating pumps are of the centrifugal type, one for each condenser. The propellers are right and left of manganese bronze. There are in each boat three water tube boilers constructed for a working pressure of 250 lbs. per sq. in. Two of these boilers are located in a water tight compartment forward of the engines and the other is in a water tight compartment abaft the engines. The total grate surface is at least 137 sq. ft. and the total heating surface at least 7,544 sq. ft. There are three smoke pipes, one for each boiler; two main feed pumps, one in the forward fire room and the other in the after engine room. These pumps have a capacity of 147 gallons per minute at a piston speed of 100 ft. per minute. There is one auxiliary feed pump, located in the forward engine room. The capacity of this pump is the same as the others. In the after engine room is one fire and bilge pump with a like capacity of 147 gallons. Two blowers are located in the forward and one in the after fire rooms. There are two evaporators and one distiller. The weight of all the machinery and boilers, including auxiliaries and radiators and water in the boilers, condensers and pipes and such stores and spare parts as may be carried on board, when fully equipped, must not exceed 79,745 lbs. A mechanical repeating telegraph of approved pattern is fitted for each engine room with its dial at the working platform of each engine, and connected to transmitters in conning tower and on deck. There is also an improved system of signals between each engine room and its adjoining fire rooms and between the engine rooms. Much attention is also paid to speaking tube arrangements.

The *Blakely* is named for Capt. Johnston Blakely, who was born in Ireland in 1771, and who became famous as commander of the fighting ship *Wasp* in the war of 1812. He attended the University of North Carolina and in February, 1800, he obtained a midshipman's warrant in the navy. He was made lieutenant Feb. 10, 1807, and in 1813 commanded the brig *Enterprise*, and did good service in protecting the coasting trade. On July 24, 1813, he was made master commander and in August was appointed to command the *Wasp*. His capture of the British brig *Reindeer*, the brig *Avon* and the brig *Atalanta* are among the historical events of the later period of the war. On Nov. 24, 1814, Blakely was made captain. The *Wasp* disappeared after her capture of the *Atalanta* and it is believed that she foundered in a gale. Blakely's only child, a daughter, was educated at the expense of the State of North Carolina. An attempt was made to find some descendant of the heroic captain to christen the boat which will so nobly bear his name, and all attempts proved futile.

The *De Long* is named for George Washington De Long, lieutenant commander of the United States navy, whose name is associated chiefly with Arctic explorations. He was born in New York city Aug. 22, 1844. His early education was obtained in Brooklyn. He was appointed acting midshipman at the United States naval academy in 1861, graduated in 1865 and was promoted to ensign Dec. 21, 1866; master, March 12, 1868; lieutenant March 29, 1869, and lieutenant commander, Nov. 1, 1879. His principal Arctic voyage was made in the *Jeannette*, which sailed from San Francisco July 8, 1879. After touching at several points, the steamer went northward and took the ice pack. She was beset Sept. 5, 1879, off Herald point. The vessel never escaped the pack, and after drifting about 600 miles to the northwest in a devious course, was crushed by the ice June 13, 1881. Lieut. Com. De Long and his party were thus adrift in the Polar seas, 150 miles from the new Siberian islands, and over 300 miles from the nearest point of the mainland in Asia, and their experiences as recorded in the diary left by Lieut. De Long is one of the sad chapters of Arctic exploration. Only two survivors reached a settlement. A searching party in March, 1882, found the records and the dead bodies of those who had perished at their last camp, including De Long. By order of the United States government the bodies were brought to this country, where they were interred with honor in New York city in 1884.

FIREPROOF WOOD NOT PERMANENT.

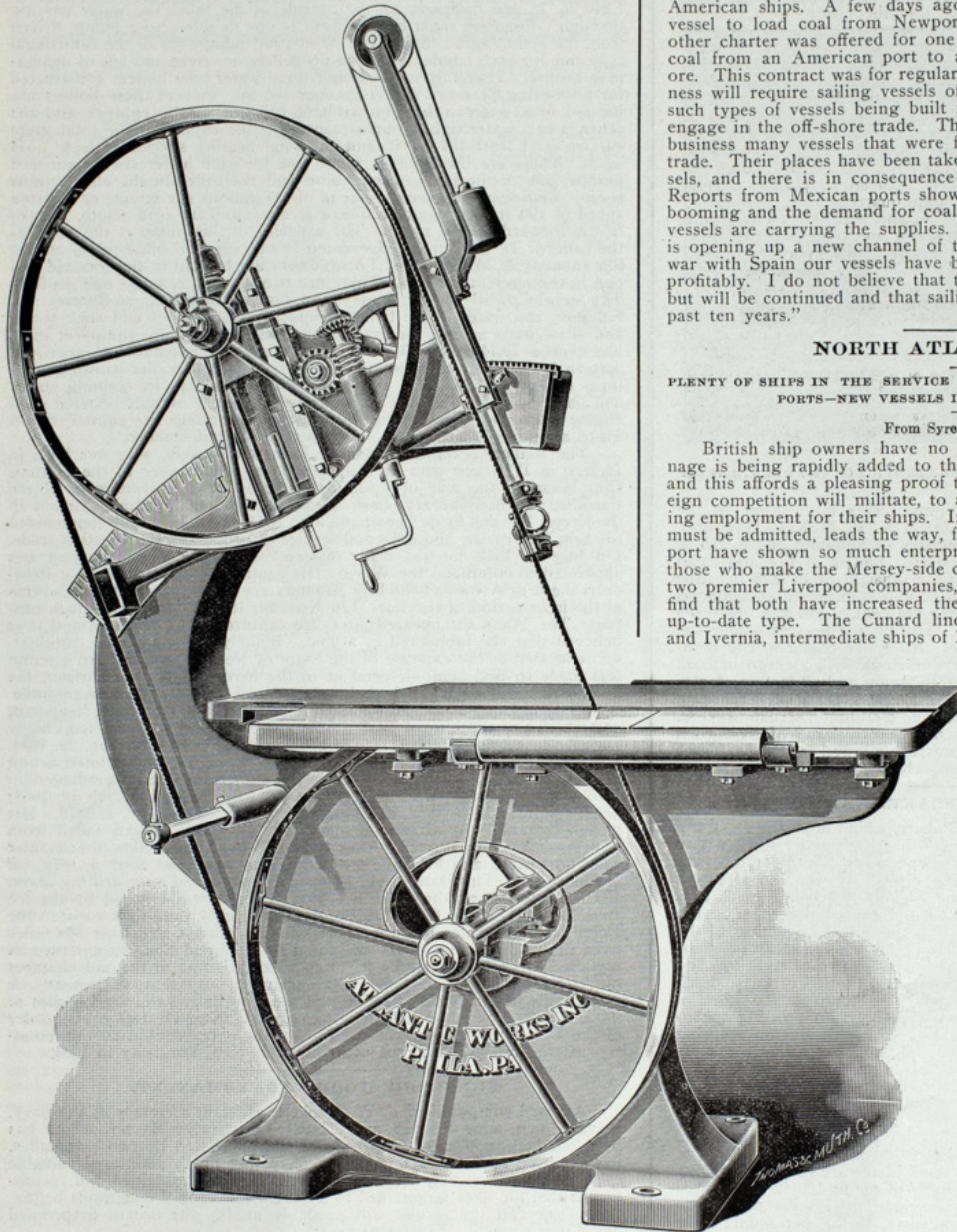
A board composed of F. W. Hackett, assistant secretary of the navy, Naval Constructor Bowles and Naval Constructor Baxter, which has been conducting tests of fireproofed wood submitted by two companies, has reported to the secretary of the navy that much additional valuable information concerning fireproofed woods had been obtained, but recommends that the tests be pursued to a conclusion upon the methods begun, "believing that the results will probably modify the use of fireproofed wood in the navy." The board says:

"The tests have already progressed sufficiently to show that the ultimate values of the woods treated by the two processes are very nearly equal; yet in both the products are imperfect in that they do not remain permanently impregnated with their fireproofing compounds under certain circumstances encountered on naval vessels. We recommend that specifications for the inspection, treatment and delivery of fireproofed wood for naval vessels be prepared immediately by the bureau of construction and repair and submitted to the department, which shall insure the use of material fireproofed and treated according to the present state of the art; which will permit the use of the products of both of these companies; and which will permit, after preliminary test or sufficient safeguard, still further competition. These specifications should be modified from time to time as the state of the art of fireproofing advances."

The American Steel Hoop Co. is going to put in steel bins at its Isabella furnaces, Aetna, Pa. This will require about 750 tons of steel, which will be furnished from one of the Pittsburg plants of the American Bridge Co. The bins will be made in accordance with the design of Julian Kennedy, mechanical engineer.

ADJUSTABLE BEVEL BAND SAW MACHINE.

The adjustable bevel band saw shown in the illustration on this page is of recent design and is well adapted to the use of ship and boat builders, navy yards and work where irregular sawing is to be done. The frame is cast in one piece with a rectangular cored section and strong enough to withstand the strain of saws up to $2\frac{1}{2}$ in. wide. The wheels are 40 in. diameter, $2\frac{3}{4}$ in. face, made with steel spokes and a continuous hard wood rim, covered with the best rubber covering, making a light, strong and elastic wheel. The wheel shafts are made of steel, are large in diameter and of good length, the bearings being lined with the best anti-friction metal and provided with oil cups.



ADJUSTABLE BEVEL BAND SAW—40 IN. WHEELS AND BALANCED GUIDE.

The table is of iron 4 ft. wide and 4 ft. 6 in. long, with extension completely covering the space between the saw line and the frame. It is planed true and lays level at all times, is provided with anti-friction rollers at each end on which to handle or move the timber. The top guide is counter-weighted for convenience in handling and to prevent accidents from falling when loosened. The top wheel is mounted on its shaft in such a manner that it can be accurately adjusted while in motion for tracking the saw, thereby regulating the path of the saw to any position on the face of the wheels. The top wheel can be tipped to an angle of 45° and can be moved for different angles while the machine is in motion, either by the operator in front or by his helper in the rear of the machine. The machine receives lumber up to 17 in. thick and will carry saws up to $2\frac{1}{2}$ in. wide, 20 ft. 6 in. long; each machine is provided with a belt shifter, one saw, soldering frame and tongs; the tight and loose pulleys are 16 in. diameter, 5 in. face, and should run 500 revolutions per minute. The weight is 2,700 lbs. The machine is made by the Atlantic Works, incorporated, Twenty-third and Arch streets, Philadelphia.

WHY THE SHIP YARDS ARE BUSY.

Mr. J. D. Dewell of New Haven, Conn., agent for the Sutton fleet of vessels, who is said to have given a contract to the Holmes Ship Building Co., Mystic, Conn., for a five-masted wooden schooner, says of the present activity in Atlantic coast ship yards: "The greatest stimulus for the shipping trade is the demand for American coal. American coal is being sought for from all the big coaling stations of the world. Steamers are carrying the coal from American ports away around to Manila, Hong Kong and other foreign coaling stations, and the fact that Great Britain is unable to supply the demand is turning the tide of business into American channels, and hence there is a demand for American ships. A few days ago I had an offer for the charter of a vessel to load coal from Newport News, Va., for Barbadoes, and another charter was offered for one of our vessels to take out a cargo of coal from an American port to a Mediterranean port and bring back ore. This contract was for regular trips for one year. This class of business will require sailing vessels of the larger size and you witness now such types of vessels being built in the ship yards, which will probably engage in the off-shore trade. The war in South Africa took out of the business many vessels that were formerly engaged in the coal carrying trade. Their places have been taken in many instances by American vessels, and there is in consequence a greater demand for sailing vessels. Reports from Mexican ports show that the industrial interests there are booming and the demand for coal there is steadily increasing. American vessels are carrying the supplies. Then, too, business with Porto Rico is opening up a new channel of trade for American vessels. Since the war with Spain our vessels have been going into the West Indian trade profitably. I do not believe that this will be a short-lived improvement, but will be continued and that sailing vessels will recuperate losses of the past ten years."

NORTH ATLANTIC TRADE.

PLENTY OF SHIPS IN THE SERVICE TO NEW YORK, BOSTON AND CANADIAN PORTS—NEW VESSELS IN ALL THE LEADING LINES.

From Syren and Shipping.

British ship owners have no intention of standing still. New tonnage is being rapidly added to the existing fleets flying the red ensign, and this affords a pleasing proof that owners do not anticipate that foreign competition will militate, to any material extent, against their finding employment for their ships. In this forward movement, Liverpool, it must be admitted, leads the way, for the ship owners of no other British port have shown so much enterprise during the past few years as have those who make the Mersey-side city their headquarters. If we take the two premier Liverpool companies, the Cunard and White Star lines, we find that both have increased their fleets by huge vessels of the most up-to-date type. The Cunard line has added to their flag the Saxonia and Ivernia, intermediate ships of 13,900 tons gross, immense cargo capacity and commodious passenger accommodation for all classes. These vessels are engaged in the Boston trade, in which the chief British rivals of the Cunard line are the Leyland and Dominion lines, both of which have their headquarters at Liverpool. The success of the 10,000-ton Winifredian demonstrated that cargo vessels fitted with first-class passenger accommodation could be relied upon to secure constant patronage, and hence Messrs. Leyland have added even larger craft of the same type to their fleet, and are now fairly launched both in the New York and Boston passenger business. Messrs. Harland & Wolff's yard has strengthened the Dominion line by the two magnificent steamers, New England and Commonwealth, vessels which, in addition to a big cargo capacity, have accommodation of the very best for all classes of passengers. The struggle for the Boston trade is thus a very interesting one. In the forties and fifties, Boston was the United States passenger port, and now, half a century later, ship owners are again realizing the possibilities of a big passenger business with the Massachusetts harbor. In the New York trade, the Cunard line still relies on its popular Lucania, Campania, Etruria and Umbria; while the White Star Co. has strengthened its hands by the

12,000-ton Cymric and the 17,000-ton Oceanic. The success of the intermediate ship Cymric has, no doubt, had something to do with the advent of the Saxonia and Ivernia, but here again competition begets competition, for Messrs. Harland & Wolff are engaged on the Celtic, a 20,000-ton vessel of the passenger and cargo type. White Star enterprise, however, is not confined to the New York trade. They have already proved that there is room in the Australian trade via the Cape. The vessels put on to this route are about 12,000 tons gross, with splendid accommodation for third-class passengers. Formerly, Liverpool's share of the trade with the Antipodes was considerable, and the effort of the White Star line to wrest a portion of it from London is an interesting feature of modern steamship enterprise.

If we turn to the Canadian trade, there is the same evidence of Liverpool progress. Messrs. Allan have added to the fleet running between Liverpool and the Dominion, the Bavarian, Tunisian and Corinthian, in addition to freight ships, while other tonnage is building. The Beaver line, since it has fallen into the hands of Messrs. Elder, Dempster & Co.,

has been augmented by the twin-screw steamers Lake Erie and Lake Champlain, while another sister ship, the Lake Nepigon, is building. Big cargo boats, with limited passenger accommodation, have also been added to the Beaver line fleet, and Canada is exploited from both Liverpool and Bristol. The West India branch of the Leyland line, which taps the trade of the southern part of the United States, has also been augmented by large tonnage. Thus there is every reason to believe that Liverpool owners will not only keep the North American trade they have secured, but will substantially increase it. This enterprise, however, is not existent to the same extent among ship owners engaged in other trades, and having their headquarters at other ports. Perhaps it may be the steady advance of Canada and the United States which is responsible for this. The ports have a continent behind them and hence there is much trade to cater for, and the healthy competition among the companies engaged in its exploitation has certainly played its part in promoting activity among Liverpool owners. In the West African trade, too, the freight requirements of this country are almost exclusively catered for by Liverpool. If we go to South Africa, the now amalgamated Union-Castle Co. shows a tangible progress, due in some measure to healthy rivalry. Here, too, the freight and passenger requirements have been provided for by magnificent new vessels specially built for the trade. But so far as other companies go their position has not—if we except, perhaps, the Clan line—materially advanced. In all probability existent tonnage has been found sufficient. In some quarters, it is freely stated that the North Atlantic is over-provided for, and that as soon as owners receive all their vessels back from South Africa, and trade declines a little with the United States and Canada, there will be more tonnage on the market than is wanted. Should such a condition of things arise, it is certain that a feeling of unrest will soon creep over British ship owning in general, for the pushing and enterprising owners of Liverpool may be relied upon to find employment somewhere or other, to the reduction both of freights and dividends all round.

GROWTH OF AMERICAN SHIPPING.

A MAGNIFICENT SHOWING IN THE COASTWISE TRADE, BUT A DIFFERENT CONDITION WHEN THE WORLD'S COMMERCE FOR THE PAST TEN YEARS IS EXAMINED—GREAT STRIDES ON THE LAKES—ANNUAL REPORT OF THE UNITED STATES COMMISSIONER OF NAVIGATION.

In its last issue the Review published a synopsis of the report of Eugene Tyler Chamberlain, United States commissioner of navigation, for the past fiscal year. It is now enabled to present a more thorough digest of the report. It is interesting to note that the year was the most prosperous known to American shipping for a long time and that the present year promises to be even more prosperous. For the first time since the civil war broke out the documented tonnage of the United States exceeds 5,000,000 gross tons. On June 30, 1900, American documented tonnage comprised 23,333 vessels of 5,164,839 gross tons, an increase of 300,000 tons over the previous fiscal year. Our maximum tonnage was 5,539,813 tons in 1861. (Our shipping was then larger than Great Britain's and nearly equaled the British empire's. British shipping now amounts to 14,261,000 gross tons). American vessels are almost wholly confined to the coasting trade, which employed last year 4,338,145 tons, or more than the total tonnage of Germany and France. Our tonnage in the foreign trade was only 816,795 tons, and carried last year only 9 per cent. of our exports and imports. A century ago American shipping registered for foreign trade was 669,921 tons, while this tonnage now in the thirteen original states amounts to 482,907 tons. For serious competition with foreign nations in the ocean carrying trade we are practically restricted to ninety-seven registered steamships of over 1,000 tons, aggregating 260,325 tons. Single foreign steamship corporations own greater tonnage. Japan has eighty-three ocean steamships of over 2,000 tons, aggregating 286,000 tons. Besides these steamships we have 125 registered square-rigged sail vessels, over 1,000 tons each, for the deep sea trade. More than half of these are over twenty years old, and as such vessels disappear their places are not supplied by new construction.

Our tonnage is distributed between the Atlantic and gulf coasts, 2,727,892 gross tons; great lakes, 1,565,587 tons; Pacific coast, including Hawaii, 612,904 tons; Mississippi and tributary rivers, 258,456 tons. Our steam vessels amount to 2,657,797 tons; documented canal boats and barges to 622,000 tons, and the remainder, 1,884,842 tons, are sail vessels and schooner barges. The increase in our shipping during the decade was 740,342 tons, of which 502,523 tons stand to the credit of the great lakes. The increase in ten years on the Pacific has been 184,512 tons, due mainly to Alaskan and Hawaiian trade, and on the Atlantic and gulf coasts only 89,297 tons, while the tonnage on the Mississippi and tributaries has decreased 36,000 tons.

RELATIONS OF THE UNITED STATES TO THE WORLD'S OCEAN CARRYING TRADE.

The report is chiefly devoted to the relations of the United States to the world's ocean carrying trade, and for this purpose changes in the world's shipping during the past ten years are examined in some detail. Since 1890 the world's steamships have increased from 12,985,000 tons to 22,369,000 gross tons, sail vessels have decreased from 9,166,000 tons to 6,674,000 tons, and the effective carrying power of the world's merchant fleets has increased 60 per cent. The most notable change in the world's shipping has been in the size of steamships. In 1890 there were 218 ocean steamships of 4,000 tons or over, while now 980 such steamships, aggregating 5,600,000 tons, constitute one-fourth of the world's steam tonnage. Increased speed, though great, has been less noteworthy. Of the ocean steam tonnage of 1890, 13 per cent., 423 screw steamships, 1,650,000 tons, were of 12 knots or over. Of ocean steam tonnage in 1900 24 per cent., 1,109 screw steamships of 5,230,000 tons, are of 12 knots or over.

The hulls of 60 per cent. of the world's shipping are now made of steel, compared with only 20 per cent. in 1890. Steel has radically changed the industrial organization of the world's ship building and ship owning. It requires expensive machinery, great capital and the employment of large numbers of specially trained mechanics, thus concentrating the world's ship building. A list of thirty principal ship yards of the United States, Great Britain, Germany and France is given which build 60 per cent. of the steamships built in the world during a year, including

war vessels, except those building in government yards. Concentration of the world's ship owning has been as notable during the decade as the centralization of ship building. A list is printed of the thirty principal steamship companies of the world which own 1,600 steamships of 5,616,000 gross tons (including some vessels now building), or one-quarter in tonnage and more than one-quarter in carrying power of the world's ocean steamships. Of these only nine of 81,000 tons, owned by the International Navigation Co., are American. Ocean carrying, through regular passenger and freight lines, is being assimilated to the methods and conditions of trunk railroad transportation. On the basis of the gross earnings reported by principal foreign steamship companies it is estimated that during 1899 the gross earnings of steam and sail vessels in the foreign carrying trade of all nations amounted to \$700,000,000.

OUR EXPORTS IN 1899 AGGREGATED 24,000,000 TONS.

The export trade of the United States requires about 20 per cent. of the world's sea-going tonnage in foreign trade, including the largest, fastest and most expensive steamships. The weight of our exports by sea in 1899 was 24,000,000 tons, of 2,240 lbs. To carry these exports and passengers, including immigrants, requires steady employment throughout the year of about 1,200 steamships, aggregating 3,600,000 gross tons, and 1,300 sailing vessels of 1,000,000 tons. The number and tonnage of vessels actually engaged is, of course, larger, as obviously many vessels are engaged only part of the year in the trade of the United States.

The problem of ocean transportation at this time is essentially one of transportation by steel screw steamships. The purposes to which wooden fore-and-aft vessels and steel square-rigged vessels are adapted are important but restricted. The Suez canal reduced opportunities for sail vessels, and the Nicaraguan canal will further reduce them.

In the past ten years Great Britain has built 4,638 steel steamships of 9,793,000 tons, while the United States has built 465 steel steam vessels of 743,000 tons, of which 198 of 450,000 tons were built on the great lakes. Our entire construction for the decade is not much more than half of Great Britain's output of 1,340,000 tons during 1899. We have built for the foreign trade since 1890 only twenty-four steel steamships of 80,000 tons and of this total eleven steamships of 58,000 tons were built as mail steamships under the postal subsidy acts. If the outlook for the building of steel steamships in the United States were not at present more promising than of late years legislation for the development of American shipping would probably prove futile.

ORDERS FOR COASTING VESSELS AND VESSELS OF WAR HAVE FILLED OUR SHIP YARDS.

On Aug. 15, 1900, sixty-eight merchant steel steam vessels aggregating 278,000 tons, and forty-seven naval vessels 113,000 tons (displacement) were building or contracted for in the United States. Contracts since that date (some since election not included in the report) bring the merchant total up to 350,000 tons, including about 100,000 tons on the lakes. Congress has authorized 179,800 tons (displacement) of naval vessels, not yet contracted for. Part of the merchant construction will not be completed in two years or more, but the current year will record much the largest amount of steel ship building in our history. The coasting law and its recent extensions, our heavy expenditures for naval construction, and the building of vessels to replace those bought for transports, and the postal subsidy law, have given steel ship building its recent stimulus. In the United States the conditions have now been established, abundance of capital, cheap materials, practical experience, constructive talent and skilled labor, which, if brought together by a demand for American vessels, created by legislation, guarantee the country's future as a maritime commercial power.

Mr. Chamberlain reviews in some detail the bills reported to the senate and house of representatives, known as the subsidy bills, with illustrations of the difference in cost of building and operating American and British steamships at the present time. It is shown that the subsidies proposed generally equalize those differences. A freight steamship carrying 5,000 tons cargo now costs \$275,000 in the United States, compared with \$214,000 in Great Britain, though steel is much cheaper here than abroad. Besides labor cost the British advantage lies in the enormous scale of production, Great Britain being the world's "department store" of shipping. Monthly wages on the American vessel are \$1,200 against \$900 on the British ship. Comparisons are made with foreign subsidies to fast steamships which aggregate \$20,000,000 annually, and it is held that the subsidies proposed for similar American steamships are not more than adequate to secure American ocean mail services to the great continents, equivalent to those of Great Britain, Germany and France. In the past sixty years Great Britain and her colonies have spent over \$240,000,000 for British ocean mail steamships.

On the basis of foreign voyages actually made by American vessels, aggregating 809,000 gross tons, during the calendar year 1899, the expenditures under the senate subsidy bill would have been \$2,907,000, and under the house bill \$2,790,000. Details and estimates show that, with the additional shipping eligible, the cost during the first year of the bill's operation would be about \$4,500,000. The maximum of \$9,000,000 would probably be attained during 1904-5, when a reduction of subsidy rates would be necessary. By that time the building of over 500,000 tons of ocean steamships and the necessary increase in number and extent of our ship yards would have materially reduced the cost of ship building in the United States, compared with Great Britain and Germany. Under the bill in five years American steamships in foreign trade would doubtless reach 1,200,000 tons, and sail vessels 650,000 tons, sufficient to carry about one-third of our ocean trade.

The act restricting trade between the United States and Hawaii to American vessels is important in developing our shipping interests in the Pacific. The new Australian confederation is likely to adopt the American coasting principle next year.

Tonnage taxes during the year were \$880,482. In view of our great expenditure for harbor improvements and lighting the coast there seems to be no reason why our tonnage taxes should be so much less than corresponding foreign charges. The report considers various minor matters relating to American shipping interests. It will not be ready for distribution before December.

E. I. White of Machias, Me., has begun the construction of a three-masted schooner.

SHIP BUILDING ON THE COAST OF MAINE.

Not for many years has the coast of Maine, particularly along the shores of Penobscot bay, witnessed such a renewal of wooden ship building as in the year now drawing to a close. Crowded yards are found everywhere in the Belfast and Waldoboro districts. The yards at Bucksport, Machias, Belfast and other places have not been idle, but the bulk of the building has been at Camden, Rockland and Waldoboro. The conclusion of the year will find the sum total of the tonnage of the various vessels built in 1900 along the Maine coast to be far in excess of those turned out in any previous year. The reason for the increased activity in Maine ship yards, many of which for years have been practically idle, is not far to seek and is found in the high rates being paid for freights and consequent demands for vessels brought about by the general prosperity of the country.

The most noteworthy feature in the building is in the size. Very large vessels are demanded and now four and five masters are about as common on the stocks as two and three-masters were a dozen years ago.

In the Belfast district, by far the greater portion of the building has been done at the well known yard of H. M. Bean, the Camden builder. Mr. Bean has turned out three vessels thus far this year. The Malcolm Baxter, Jr., was launched the latter part of March. The Baxter is a four-masted schooner with a net tonnage of 1,530, a gross tonnage of 1,722 and a carrying capacity of 2,700. She is 210 ft. on the keel, 46 ft. wide and her hold depth is 24 ft. The Baxter was built for Capt. George Bailey of New Jersey. Next came the large sailing vessel George W. Wells, whose tonnage is 2,900, and whose carrying capacity is 5,000 tons of coal. The third vessel, the five-masted schooner Van Allens Boughton, was launched last Thursday. She is 150 ft. long, 46 ft. wide, and 26 ft. deep. Her gross tonnage is 2,129 and net tonnage 1,905. Mr. Bean employs about 125 men at his yard. He expects to see the good ship building times continue, and will, at any rate, be busy for some time to come. Work is to be at once begun on a four-master to have a 170 ft. keel, and next summer Mr. Bean will start another five-master for Capt. Crowley of Taunton, Mass.

Two three-masted schooners have been built at Belfast this summer, the Theoline of 447 net tons by George Gilchrest and the Pendleton Sisters launched last Thursday from the yard of Pendleton Bros. The Pendleton Sisters is of 798 tons gross and 704 net, keel 116 ft.; registered length, 175 ft.; beam, 37 ft. 9 in.; depth, 18 ft. 9 in.; length over all, 191 ft. Her masts, 93 ft. long, are of Oregon pine, her frame of hard wood and hackmatack and plank and ceiling of yellow pine. The stem and stern are of oak. Several small boats have been built by C. F. Brown, the North Haven builder, including the sloop Winnebago of 14 tons burden.

Not for many years have so many vessels been built in the Waldoboro district as this season. This is largely due to the revival of the industry at Rockland. Cobb, Butler & Co. concluded to open their yard, and they have turned out two handsome vessels, the Geneva and the Wellfleet and now have a large crew at work on a large five-master, the Rebecca Palmer, which, when completed will be the biggest vessel ever built in Rockland. The Wellfleet, a three-master, was launched in March and marked the first launching from a Rockland ship yard for seven years. The Wellfleet is a single-decked vessel with the following dimensions: Gross tonnage, 600; net tonnage, 496; registered length, 161 ft.; breadth, 35 ft.; depth, 14.5. Her frame is of oak and hackmatack, ceiling and planking of yellow pine and deck planking of white pine. The Wellfleet was followed by the Geneva, a handsome four-masted schooner launched in September. The Geneva is 160 ft. long on the keel, 190 ft. over all, with a beam of 37.3. She draws 17 ft. of water and has two full decks and a small poop deck. The Rebecca Palmer, the five-master now building, will be launched about the first of the year. Her keel is 251 ft. long, breadth 45 ft., depth 26½ ft. Her masts are 116 ft. long and her owner estimates that her carrying capacity will be about 4,000 tons. The owners are William Palmer and others of Boston.

At the Cobb-Butler yard a keel has been laid for a four-master to be built for Crowell & Thurlow of Boston, to be completed early next spring. She will be 210 ft. keel, 42 ft. wide and 24 ft. deep, with a carrying capacity of about 2,500 tons. The vessels which have been turned out at the Cobb-Butler yard have proven very satisfactory, being of a fine grade of workmanship and containing only the best material. At the present time the concern is employing about 150 men. A good business is expected next year as there are many contracts in the market. I. L. Snow & Co. of Rockland are also engaged in building a three-master of 450 tons. The length of keel is 107 ft., beam 31 ft. and depth 8 ft.

The sound of the hammer and the saw has rung out merrily in Thomaston ship yards during the past season. Washburn Bros. in March launched a large four-master, the John E. Devlin, and now have on the ways the biggest vessel ever in course of construction at Thomaston. This is a four-masted schooner with a net tonnage of about 1,400. She will be launched the last of November or first of December. The Devlin is 180 ft. long on the keel; 41 ft. beam; 19 ft. deep and has a gross tonnage of about 1,100. Her frame is of solid Virginia oak and the ceiling and planking of yellow pine. The same concern has a frame for another four-master on the way from Virginia and will at once begin work on its arrival. Dunn & Elliot of Thomaston have also been busy at their yard this season launching the Thomas S. Dennison, a beautiful four-master, the latter part of August. The Dennison has a gross tonnage of 1,537 tons, net 1,376 tons. The vessel is 218.2 ft. in length, 42.7 in breadth and 19.7 ft. depth of hold. Her frame is a heavy one of Virginia oak and she is substantially built in every way. Dunn & Elliot plan for plenty of work next year and regard the outlook as very promising.

A week ago the Fannie Palmer, a large five-master, was launched from the yard of George L. Welt of Waldoboro. The Palmer is 240 ft. length of keel; over all, 280 ft.; 40 ft. beam, and 25 ft. deep. Her gross tonnage is 2,000. The Palmer has thus far been rather unfortunate as she is now ashore on the flats, owing to an attempt to tow her in heavy weather. Tugs have not been able to get her off and a crew of workmen is now engaged digging a trench through which to float her. Mr. Welt

is getting the keel out for another five-master to be a sister ship to the Fannie Palmer. The vessel to be built will be named the Baker Palmer. There have, in addition to these larger craft, been quite a number of sloops and small boats built in the district, particularly at Friendship.

The vessels built this season in the Belfast and Waldoboro districts, including those which are yet to be launched, are as follows:

BELFAST DISTRICT.		Net tonnage.
Sch. Malcolm Baxter, Jr., H. M. Bean, Camden.....	1530	
Sch. George W. Wells, H. M. Bean, Camden.....	2745	
Sch. Van Allens Boughton, H. M. Bean, Camden.....	1905	
Sch. Pendleton Sisters, Pendleton Bros., Belfast.....	704	
Sch. Theoline, George Gilchrest, Belfast.....	477	
Slp. Winnebago, C. F. Brown, No. Haven.....	14	
WALDOBORO DISTRICT.		Net tonnage.
Sch. Wellfleet, Cobb-Butler, Rockland.....	496	
Sch. Geneva, Cobb-Butler, Rockland.....	776	
Slp. Lulu Marion, W. A. Morse, Friendship.....	8	
Slp. Bernese & Belle, W. A. Morse, Friendship.....	12	
Slp. Vincie E., W. A. Morse, Friendship.....	5	
Slp. Gertrude and Herbert, W. A. Morse, Friendship.....	9	
Slp. Golden Hope, W. A. Morse, Friendship.....	7	
Slp. Columbia, W. A. Morse, Friendship.....	5	
Slp. Sculpin, W. A. Morse, Friendship.....	8	
Slp. Josephine, W. A. Morse, Friendship.....	8	
Sch. Volunteer, Chas. Morse, Friendship.....	5	
Slp. Little Foster, Chas. Morse, Friendship.....	7	
Sch. Susie B., Lorenzo Walton, Friendship.....	11	
Slp. Clyde and Astor, Clifford Winchenpaw, Waldoboro.....	6	
Sch. ———, I. L. Snow, Rockland.....	450	
Sch. Thomas S. Dennison, Dunn & Elliot, Thomaston.....	1376	
Sch. John E. Devlin, Washburn Bros., Thomaston.....	1000	
Sch. ———, Washburn Bros., Thomaston.....	1400	
Sch. Fannie Palmer, Geo. L. Welt, Waldoboro.....	1850	

LARGE ORDERS UNDER WAY AT SPARROW'S POINT.

The Maryland Steel Co., Sparrow's Point, Md., is about to close another contract to build two steamships for eastern capitalists. Details will be given out as soon as the contracts are signed. The company is now at work on the plans of two 600-ft. steamers to fly the American flag in the Atlantic Transport line service between New York and London. They are to be 65 ft. wide and 44 ft. depth of hold. They will register 13,750 tons, which is 2,000 tons greater than the St. Louis or the St. Paul. These ships are to be the largest ever built in the United States, and will be bigger than the crack Cunard, White Star and French liners. They will have twin screws and five steel decks, which will accommodate 20,000 tons of cargo. The ships will cost \$1,500,000 each.

The dredging steamer Thomas has had steam on her, and she will be sent to New York in about ten days. Her sister vessel, the Mills, will be launched from the ways in three weeks. These dredges are marvels of marine architecture. They are sea-going steel steamers, 300 ft. long, which suck up the soil from a channel through the bottom of the ships and deposit the earth in the ships' hulls. Then they steam to sea and discharge. They will hold 3,000 tons of mud each. The suction pumps are 4 ft. across their mouths. They will be the largest vessels of the kind in the world, and will dredge a 40-ft. channel from New York to the sea.

Probably the most important contracts being completed by the Maryland Steel Co. is one for three large and swift torpedo boat destroyers for the United States government. The vessels are the Truxton, the Whipple and the Worden. All three vessels are being built alike. The vessels are partially plated, and their machinery is rapidly nearing completion. They are the largest destroyers now under construction, and will be capable of making 30 knots an hour. The vessels will be 259 ft. 6 in. long over all, 22 ft. 6 in. beam and 14 ft. 8 in. deep. Triple expansion engines will develop 8,400 H.P. These vessels, which are of the twin-screw type, will probably be completed early next year. Keels are being laid for two 5,000-ton American tramp steamers for Boston capitalists. These ships are to be 350 ft. long, 45 ft. beam and to have a depth of 28 ft. They will be duplicates of the Hyades and Pleiades, recently completed at the works.

The company is building a large steel car float for the New York, Philadelphia & Norfolk Railroad Co. for service at the mouth of the Chesapeake bay. This float, when completed, will be one of the largest in this country. This immense floating dock will be 340 ft. long and 40 ft. 4 in. beam. Four tracks will be constructed on its deck, and the float will be capable of carrying twenty-eight loaded freight cars. It will be supplied with steam pumps and steam steering gear. The float will be used between Norfolk and Cape Charles, and will probably be completed early next year.

The great steel floating dry dock for Algiers, La., which is to lift an 18,000-ton battleship, is in frame and plated. The dock is 525 ft. long and 126 ft. wide. It will weigh 5,702 tons, and is to cost nearly \$1,000,000. It will be the largest floating dock in the world.

Sparrow's Point now gives employment to 3,500 men. Orders for steel rails are coming in from all parts of the world. It is expected that a fleet of steel-laden vessels will be at sea from Sparrow's Point for a year or more to come. To meet the demand for more employees the company is now constructing three blocks of new residences. These cottages will be constructed with sixteen in a square, each having a lawn, and will number about fifty new dwellings. They will be two and a half stories high, with seven rooms each, and are to have all modern conveniences.

Another novel card relating to the last trips of the Cleveland & Buffalo line steamers City of Erie and City of Buffalo has just been issued by Passenger Agent Herman. A state room scene, with the title "Resting 'til 1901," shows the steamers tucked beneath the sheets in upper and lower berths. The last trip from Cleveland will be made on Thursday of this week and from Buffalo on Friday.

Hunters' Rates—From Nov. 9 to Nov. 30 the Nickel Plate road will sell excursion tickets to hunting parties of three or more traveling together on one ticket at one fare for the round trip. Return limit Dec. 2. There are immense quantities of small game along the line of the Nickel Plate road in western Ohio and Indiana. Write, wire, 'phone or call on nearest agent, C. A. Asterlin, T. P. A., Ft. Wayne, Ind., or E. A. Akers, C. P. & T. A., Cleveland, O.

NAVAL DRY DOCKS.

Much interesting information in regard to carrying out improvements at the various navy yards and shore stations, to put the navy in better condition for hostilities than it was at the beginning of the war with Spain, is contained in the annual report of Rear Admiral Mordecai T. Endicott, chief of the bureau of yards and docks. The admiral says that the yards and stations are in much better condition today to meet a similar demand (the war with Spain) than they were two years ago. He estimates that to continue the work of improvement during the next fiscal year \$12,456,390 will be required. More than \$11,000,000 of this amount is for public works, but much of it is to continue projects heretofore authorized. This is notably the case in the items for dry docks and certain large buildings at New York, Boston, League Island, Portsmouth and Mare island. Of the dry docks authorized by congress in March, 1899, all are in progress. The steel floating dry dock to be located at Algiers, La., and now under construction at Sparrow's Point, Md., will probably be floated and towed to its destination as soon as the weather will permit in the spring. The dock at Portsmouth, N. H., is advancing successfully. Three failures of the cofferdam of the Boston dock caused much delay and the dock will not be completed within the contract time of two and a half years. Speaking generally of the dry docks, Admiral Endicott says:

"The docks now under construction and authorized will constitute a large addition to the docking facilities of the navy, but the great increase in the number of vessels to be docked in times of war, or when repairing or commissioning considerable numbers, will require still more docks than are now provided for. No specific estimate is made for such in this report, but it is recommended that an appropriation be made for the construction of one in the Philippines as soon as the department shall have decided upon the best harbor and site for a naval station adequate in every way for the largest vessels."

In the last fiscal year the cost of labor and material at the New York navy yard was \$1,188,053. Of the repair work on dry dock No. 2 at the New York yard, which has had an unfortunate experience, Admiral Endicott says:

"The work was well advanced at the end of the fiscal year, and it is expected that it will be entirely completed and the dock put into service again by the end of the present calendar year. Very little granite is being used in its construction and when complete it will be practically a concrete dry dock with a wooden floor. The history of this dock is another chapter in the unwisdom of building these great and important works of a perishable material, and shows how, while the first cost may be smaller, the ultimate cost is vastly greater and the risks and dangers involved in their use great and unwarranted. The original cost of this dry dock, completed in 1890, was \$595,000. The repairs and renewals now being made will consume nearly the whole of the \$600,000 appropriated. The expenditures during the fiscal year were \$190,255."

An estimate of \$500,000 is submitted to continue work on the granite and concrete dry dock at the New York navy yard authorized by the last naval act.

ADMIRAL HICHBORN IS CHIEF CONSTRUCTOR.

Secretary Long has decided two of the main points in contention between the majority of the naval board on construction and Rear Admiral Philip Hichborn, chief of the bureau of construction and repair, in such a way as to give a victory to both sides in their most recent professional controversy, which has not been without considerable personal ill-feeling. While Admiral Hichborn was attending the launching of the torpedo boat Lawrence at Weymouth, Mass., early this month his four colleagues on the board on construction held a meeting and decided to recommend to the secretary of the navy that Admiral Hichborn be prohibited from using the title chief constructor of the navy in the advertisements for bids and the specifications for the new battleships and armored cruisers, and that he be compelled to use, instead, the impersonal term "Bureau of Construction and Repairs."

When Admiral Hichborn returned to Washington he made a protest to the secretary against the action of the board. He said that an attempt was being made to deprive him of his rightful rank and title, and intimated that the action of the board was the result of personal ill-feeling. This protest was reduced to writing and incorporated with it were some recommendations of Admiral Hichborn in regard to distribution of the work on the new vessels, among them that the emplacement of the turret hoods be transferred from the bureau of ordnance to the bureau of construction.

Secretary Long has denied the recommendation of the majority of the board that Admiral Hichborn be forbidden to use the title chief constructor, holding that as Admiral Hichborn is entitled to that designation he has a perfect right to use it if he so prefers. In the matter of the turret hoods the secretary has declined to make the transfer recommended by Admiral Hichborn. A number of other minor suggestions made by both parties to the controversy are now being considered by Capt. Lemly, the judge advocate general of the navy, and while the latter has not made a full report it has been learned that the secretary will sustain the majority of the board in most of these, basing his decision in each case on the letter and spirit of the naval regulations.

WESTINGHOUSE CHIEF ENGINEER.

Mr. Asa M. Mattice has been appointed chief engineer of the Westinghouse Electric & Manufacturing Co., and will enter upon his duties in December. Mr. Mattice was for ten years, up to a year ago, principal assistant to E. D. Levitt of Cambridgeport, Mass., and has been actively connected with the design of all the large machinery coming from Levitt's office during that time. During the past year he has been remodeling the Cocheco Cotton Mills at Dover, N. H. He is an engineer graduate of the Naval Academy of the class of '74, of which class Mr. B. N. Warren, vice-president of the Westinghouse Electric & Manufacturing Co., is also a member. He was assistant to Admiral Melville at the beginning of the new navy, and had an important part in the design of the machinery of the Maine, San Francisco and others of the important early ships. The Westinghouse company is to be congratulated on the additional strength which he will give to their already strong engineering staff.

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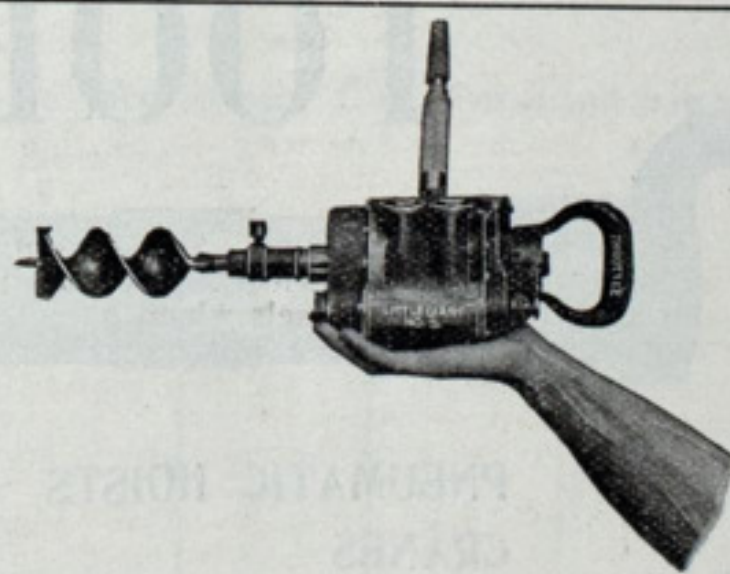


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"The Best Yet." Will Drive Perfectly One Inch Rivets. No Vibration. Guaranteed Against Repair for One Year. Our Hammers are unexcelled for all classes of Riveting, Chipping, Calking, Beading, Etc. MADE IN ALL SIZES.

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The "Little Giant" Reversible Boring Machine No. 5

Especially Designed for Shipyard and Dock Work. Will Bore up to 4" in Diameter in any kind of wood. Piston type. Weight, 14 lbs. Very Powerful. Will perform the work of five men. In use in all the U. S. Navy Yards and Large Shipyards.

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MANUFACTURERS OF PNEUMATIC TOOLS AND APPLIANCES OF EVERY DESCRIPTION.

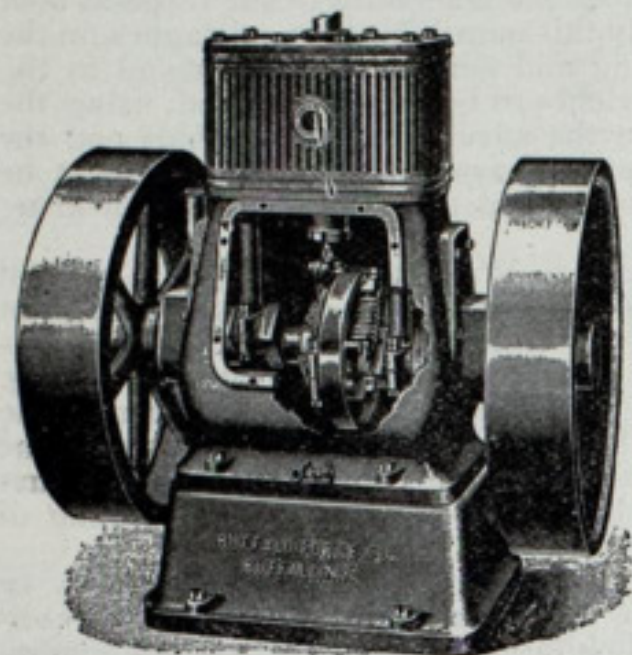
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BUFFALO DOUBLE SINGLE-ACTING ENGINE.

In the accompanying illustration is shown a compact little engine which embodies a number of interesting points of design. It is a two-cylinder single-acting machine representing one of a great many different types turned out in the engine department of the Buffalo Forge Co., Buffalo, N. Y. The two cylinders, in each of which the diameter is



equal to the stroke, are placed side by side, and are cast in one piece with the valve chest. This is bolted to the cast iron frame, the addition of removable side-plates to which serves to wholly enclose the rotating and reciprocating parts, to afford an entirely dust-proof and oil-tight construction, and also to give ready accessibility to the moving parts. Lubrication is most thorough, owing to the feature of enclosing the engine to run in oil. By the motion of the rotating parts, all rubbing surfaces are continuously supplied with oil from the bottom of the bed. This system, which may almost be said to have rendered possible the splendid performance of present day high speed horizontal engines, has been applied with equal success by the Buffalo company to engines of the vertical type.

The valve gear is under the control of a centrifugal governor, placed not in the fly-wheel, but on a disc within the bed. The swinging eccentric of this governor actuates a single valve, which admits steam to both cylinders on the downward strokes, the cranks being set 180° apart. Forged steel shafts are used exclusively, while the piston rods are of the best machine steel. A sub-base of appropriate design is furnished, and this may be arranged if desired for dynamo direct connection.

The features of automatic regulation, dust-proof enclosure and copious lubrication are coupled with excellent steam economy for a small unit, so that the engine recommends itself for a variety of uses, on land and shipboard. It is built in ranges of sizes to develop from 1 to 14 H.P. on 80 lbs. pressure.

Arthur D. Story, Essex, Mass., has received a contract to build a tugboat for a company just formed at Essex.

LETTER FROM SIR THOMAS LIPTON.

Capt. Geo. L. Norton, the editor of the Marine Journal, New York, sent Sir Thomas Lipton the official figures of the average velocity of the wind off Newport and Sandy Hook. They showed that the wind off Sandy Hook was from three to six miles stronger than off Newport. Sir Thomas Lipton sent this reply to Capt. Norton:

"I am in receipt of your letter of the 26th ult. and thank you most sincerely for your kind expressions. With regard to my views as to whether the next contest for the America's cup should take place at Sandy Hook or at Newport, I should say that the committee of the New York yacht club are the best judges. I do not, however, think that there could be a fairer or better course in the world than that off Sandy Hook. Personally I have a liking for it—born, I suppose, of my long stay there last year—certainly I have had plenty of opportunity of becoming acquainted with it. As regards being overcrowded by steamers, I do not worry in the slightest about this. There never was in the history of yachting a clearer course than we had the last contest, and I am sure the captains of accompanying steamers in their own interests will do everything they can to meet the wishes of those in charge of the racing yachts. The manner in which the New York yacht club arranged for keeping the course clear last year could not be improved upon."

TRADE NOTES.

A new power station for the Grand Rapids Co. at Grand Rapids, Mich., will be 111 ft. wide and 147 ft. long, furnished by the American Bridge Co.

The Naval Electric Co., 95 Liberty street, New York, has recently rewired the fireboat New Yorker, has several large contracts in view and is furnishing quite a large amount of supplies to the government. This company furnishes complete electric lighting plants, including search lights and storage batteries, for yachts and steamships, and reports the outlook as good for trade in yacht lines this fall.

The Kenney Co. has begun a suit in the circuit court of the United States for the eastern district of Michigan against the Ideal Manufacturing Co. of Detroit, to restrain the infringement by the latter company of the patents of the Kenney Co. The Ideal Manufacturing Co. has placed upon the market, under the name "Volumeter" a flushing valve which is claimed to be a direct infringement of the Kenney valve, widely known in connection with the celebrated trademark "Flushometer." The bill of complaint in the case asks for an injunction and an accounting for profits.

Paris Exposition, 1900, confers Highest Award and 2 Gold Medals

(Only Gold Medals in this Class.)

HAMMERS

for Chipping
" Chalking
" Riveting
" Beading
" Stone Cutting, etc.

RIVETERS

for Shipyard use
" Boiler work
" Bridge work
" Structural work

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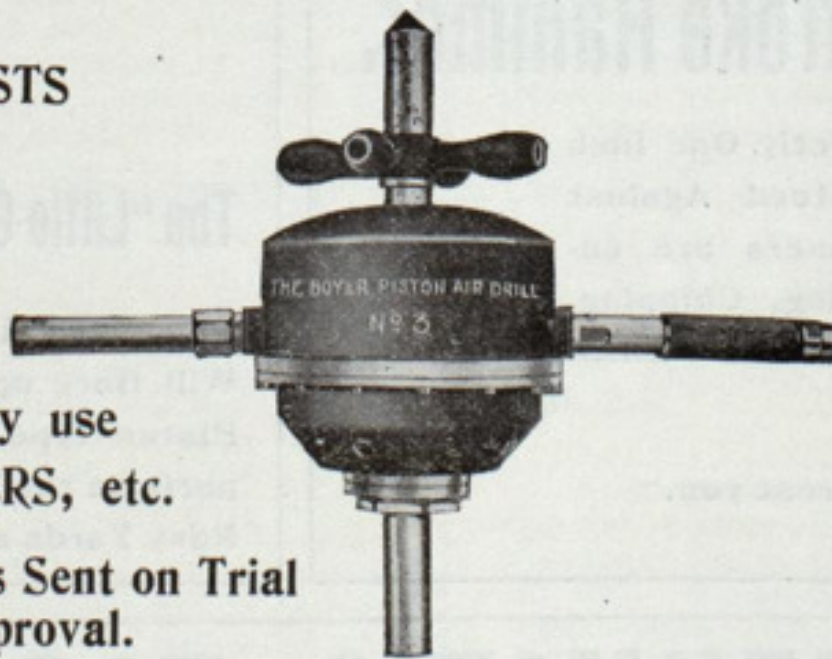
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PARIS OFFICES,

August 21, 1900.

Chicago Pneumatic Tool Company,
Chicago.

Gentlemen:

Officially I desire to inform you that your pneumatic tools received at the hands of the International Jury of Award, a Gold medal. Also that Mr. Boyer was awarded a Gold Medal as collaborator and inventor of the tools.

Yours very truly,

J. E. Smith
Director of Machinery & Electricity.

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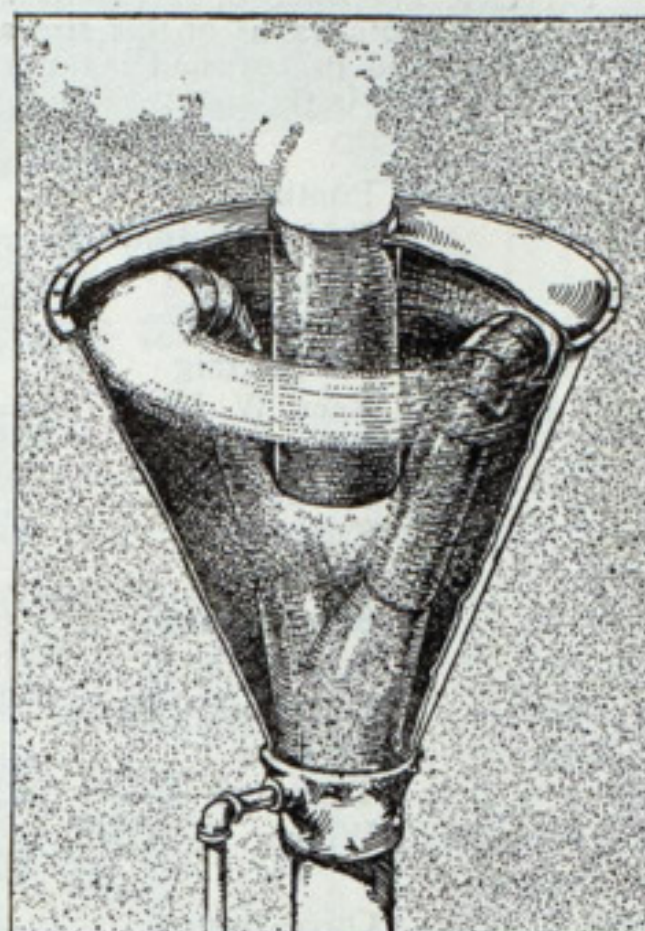
DAY OF THE SAILING VESSEL NOT YET AT AN END.

Referring to the large wooden sailing vessels built recently in New England yards, the London Express says:

"America has just turned out from the ship building yards of Maine the two biggest schooners ever launched. One is a five-master and the other creates a new record by carrying no fewer than six masts—each of them with over 100 ft. of Oregon pine in the lower mast alone. The six-master is more than 300 ft. long, has 12,000 square yards of canvas, and can carry 5,000 tons of coal—a species of freight mentioned by our Boston correspondent with a keen appreciation of England's present interest in transatlantic coal supplies. Most wonderful detail of all, she can be navigated by a crew of fourteen men, whereas, our correspondent claims, a square-rigged vessel would require twice as many. This is a point on which sailing experts may differ with him, but the main point is that a crew small in numbers can handle a huge carrying machine deriving its motive power from the inexpensive breezes of heaven. Most ordinary people thought, and think, that the day of the sailing vessel is passed. Sentimental folk, with an eye for picturesque marine effects, may be heard on any excursion steamer admiring the casual bark or brigantine encountered in the lower reaches of the Thames (full-rigged ships are less often met with) and deploring the crowding out of the graceful sailing vessel by the ugly and womanlike steamer. It seems that the plaint is quite uncalled for. The steamer has displaced the sailing ship for all time as a carrier of mails and passengers and of perishable goods that need rapid transit for the market, but there is plenty of work for the good ship with stout wooden hull and fluttering wings of canvas. Her day is by no means over. Possibly a new era of activity is before the sail-driven vessel. With the price of coal ever raising and the difficulty of obtaining sailors and firemen ever on the increase, it may be found better economy to use the slower sailing vessel than the hurrying steamer, with great saving of the initial expense of powerful engines and the current expenses of crew and fuel. It may be interesting to quote a few figures giving the relative tonnage of steamers and sailing vessels dealing with British commerce at a comparatively recent period. A dozen years ago the steamships of Great Britain and the colonies represented a tonnage of 4,615,000, as against the 4,435,000 of our sailing vessels, while the ships of the United States (apparently about to show us the way in utilizing sail power) were reckoned at 1,770,000 tonnage for steamers, as against 2,540,000 for sailing vessels. Thus, in British commerce sails fairly held their own against steam, while in America the sail had a big lead in tonnage over steam. It is good news to hear that the sailing ship is not likely to be driven out of the field. She is a thing of beauty, to begin with, and aesthetic considerations are not to be disregarded when they can be combined with sound commercial advantage. That this latter point can be secured, with the combination of very big ships and relatively very small crews, appears to be clearly indicated by the line of enterprise adopted by our astute American friends—who are going to bring us cheap coal."

OPERATION OF THE STURTEVANT EXHAUST HEAD.

An interesting example of the practical application of centrifugal force is presented in the design of the Sturtevant exhaust head. The accompanying illustration serves not only to show its construction, but also its method of operation. Externally it appears to be an inverted



cone of heavy galvanized steel plate attached to the end of the exhaust pipe. Its interior construction is shown to consist of two branching pipes extending upward from and connected to the exhaust pipe. These individual pipes, which are parallel to the sides of the casing, terminate in elbows from which the steam escapes. Its contact with the circular sides of the case gives it a whirling motion, which thus gives centrifugal force an opportunity to act. Inasmuch as this force is proportional to the weight of the substance acted upon and as water weighs about 1,600 times as much as does exhaust steam, the natural result is that the water contained in the steam is thrown outward in radial lines with great force. Striking upon the sides of the cone it trickles to the bottom and there escapes through the drip pipe.

Such oil as may be entrained with the steam is likewise separated. The steam, now dry, is forced downward by the additional entering volumes and quietly escapes to the atmosphere through the central pipe. It is evident that all tendency on the part of the water to escape with the steam is most forcibly overcome by the centrifugal action. The central pipe being made larger than the supply beneath, and the cold sides of the case tending to condense a portion of the steam, it is manifest that no back pressure can be exerted upon the engine. The absence of baffle plates and the absolute simplicity of design are the best guarantees of endurance on the part of this head. It is built by the B. F. Sturtevant Co. of Boston in sizes ranging from 1 in. up to 36 in. exhaust pipe. This company has just received an order for two immense exhaust heads, one for a 30-in. pipe and one for a 36-in. pipe, which are to be built on this design.

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Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynisien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890.....	22,576	820									
1891.....	22,749	22,777	68								
1892.....	22,749	22,801	23,274	7,753							
1893.....	22,793	22,781	22,762	22,749							
1894.....	22,813	22,789	22,858	22,813	12,567						
1895.....	22,891	22,922	22,913	22,936	13,629	9,571					
1896.....	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897.....	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898.....	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899.....	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total.....	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE, ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

PHOTOGRAPHS OF LAKE VESSELS.

It is not an easy matter to secure good photographs of lake vessels, even in the connecting rivers. This is especially true when an effort is made to get large pictures. A photographer who spent a couple of weeks in September on the St. Clair river making pictures for the Review did not succeed in getting all that he expected, but some of the views are very fine. The negatives are 11x14 in. No photographs of this size are to be had from any other source. There is no background in any of them—just clear sky and open water. Following is the list:

STEAMERS.

Angeline	Iosco	Pontiac
Birckhead, P. H.	Iron King	Pridgeon, John, Jr.
Boston	Kaliyuga	Princeton
Boyce, Mary H.	Leafield	Queen City
Buffalo (two views)	Linn, Wm. R.	Ravenscraig
City of Alpena	McWilliams, John J.	Rees, W. D.
(Side-wheeler)	Maruba	Reis, Wm. E.
Conestoga & Monarch	Mariposa	Rhodes, W. C.
(on one print)	Mataafa	Sacramento
Davidson, Thos.	Mills, Robt.	Saxon
Delaware	Nicholas, I. W.	Susquehanna
Eddy, John F.	Nicol, John M.	Sparta
Hanna, M. A.	Northern Light	Stevens, W. H.
Harper, John	Northern King	Syracuse
Hopkins, Mark	Penobscot	Tuscarora
Huron	Pittsburg (Pass. stmr.)	Wilbur, E. P.

TOW BARGES.

Abyssinia	Chattanooga	Olive Jeanette
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A single print will be delivered to any address, express prepaid, at \$1.50, or \$5.00 for four. These photographs are too large to trust to the mails. If called for at the office of the Marine Review, Perry-Payne building, Cleveland, copies may be had at \$1.25 each.

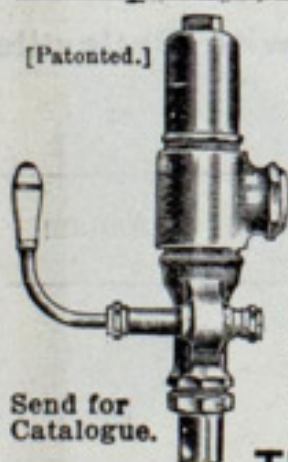
VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of November 27, 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	43 1/2	44 1/4	42 1/4	43 3/4
American Steel & Wire, Pfd.....	88	88 1/2	87	87
Federal Steel	49 3/4	50 1/4	49 1/4	49 3/4
Federal Steel, Pfd.....	76	76 1/2	75 3/4	75 3/4
National Steel	37 1/4	37 1/4	36 3/4	36 3/4
National Steel, Pfd.....	92	.....	.....	92
American Tin Plate	43 1/2	43 1/2	42 3/4	42 3/4
American Tin Plate, Pfd.....	.....	.....	.....	.....
American Steel Hoop.....	29 3/4	29 3/4	29 1/2	29 1/2
American Steel Hoop, Pfd.....	.....	.....	.....	.....
Republic Iron & Steel	16 1/2	16 1/2	16 3/8	16 3/8
Republic Iron & Steel, Pfd.....	65 1/2	65 1/2	65 1/4	65 3/8



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Owners and Constructors of Steamships, Yachts and Steamboats have found it indispensable.

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WORTHINGTON PUMP FOR SALE CHEAP.

Size 17x22x15 in. In good condition. Address American Ship Building Co., Cleveland, O. Dec. 20

WANTED TO PURCHASE, RENT OR CHARTER.

Tug and scows, capacity of the latter to be 1,000 to 1,500 tons. Steam-barge owners correspond. Stone to be transported from our pier at Stone Haven, 7 miles north of Port Washington, to Lake Michigan ports. Lake Shore Stone Co., Belgium, Ozaukee Co., Wis. tf

FERRY STEAMER WANTED.

Must be suitable for winter work. Send full information to "Ubique," care Marine Review Pub. Co., Perry Payne Bldg., Cleveland, O. Dec. 13.

SMALL STEAMER WANTED.

Length 48 to 60 ft. Draught not to exceed 5 ft. Simple power; good condition; speed 10 to 12 miles an hour. Boat is to be used as a ferry. Address Erie Yacht Club, P. O. Box 148, Erie, Pa. Dec. 6

MARINE FIRE BOX BOILER FOR SALE.

10 ft. long, 7 ft. 11 in. in height, 7 ft. 10 in. in width. Steam dome 42 in. diameter by 54 in. Two furnaces, 20 sq. ft. of grate surface each 124 tubes, 3 in. x 7 ft. 1 in. Boiler, built in 1897 by Pusey & Jones Co., Wilmington, Del., is as good as new with entire new furnaces and new tubes, and has breeching, grate bars, ash pans and stands. Will warrant the boiler to pass United States inspection for marine service at 100 lbs. working pressure. Price, f. o. b. steamer or cars, \$1,600. The Johnson Iron Works, Limited, P. O. Drawer No. 241, New Orleans, La. Dec. 6

PASSENGER STEAMER FOR SALE.

Length over all, 177 ft.; beam on water line, 29 ft.; beam on deck (concaved) 40 ft. Rebuilt in 1893. Carries 500 tons freight. Allowed 500 passengers; will sleep 120 and can be made to sleep 200. Good cabin outfit. Steeple compound engines, double fire-box boiler. Speed, 11 1/2 miles. Reason for selling is that vessel is not speedy enough for present service. Address Passenger Steamer, tf

THE MARINE REVIEW PUB. CO., Cleveland.

PASSENGER AND FREIGHT STEAMER WANTED.

Must have suitable night accommodations for at least 75 passengers, and freight capacity of not less than 300 tons, on draught not exceeding 13 feet. Address No. 400, the Marine Review Pub. Co., Perry-Payne Bldg., Cleveland, O. Dec. 6

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf

Blue Book of American Shipping.

1900 EDITION
Lately from the Press.

STANDARD MARINE AND NAVAL DIRECTORY OF THE UNITED STATES.

ONLY PUBLICATION OF ITS KIND IN AMERICA.

Particulars of all vessels of the United States and Canada with names and addresses of owners.

A directory of steamship lines with names of purchasing agents and chief engineers.

Contains in 500 pages information on shipping subjects collected in the office of the Marine Review during ten years past.

Lists of ship and engine builders, dry docks, naval architects, marine engineers, ship masters, dredging concerns, iron mining companies, etc.

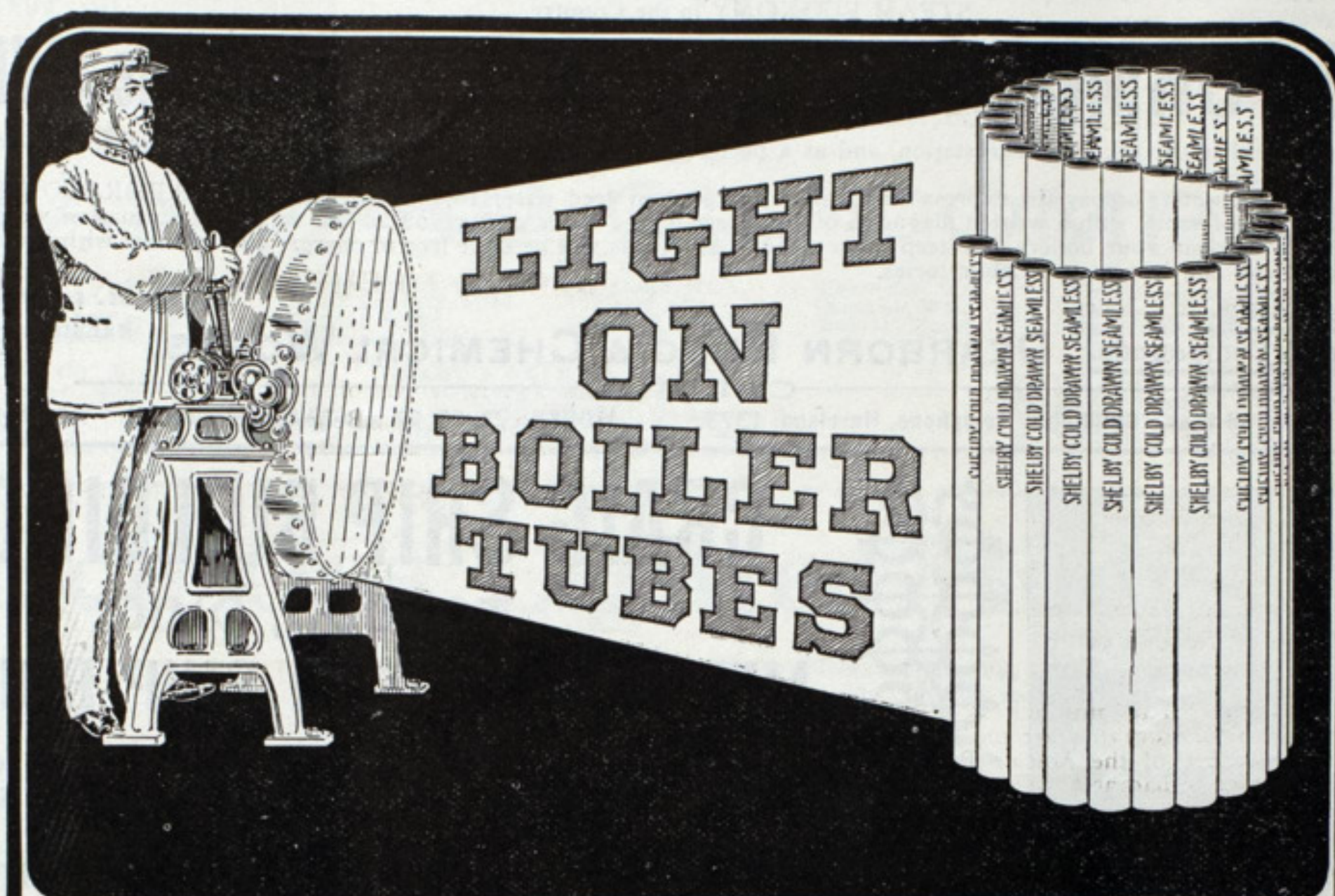
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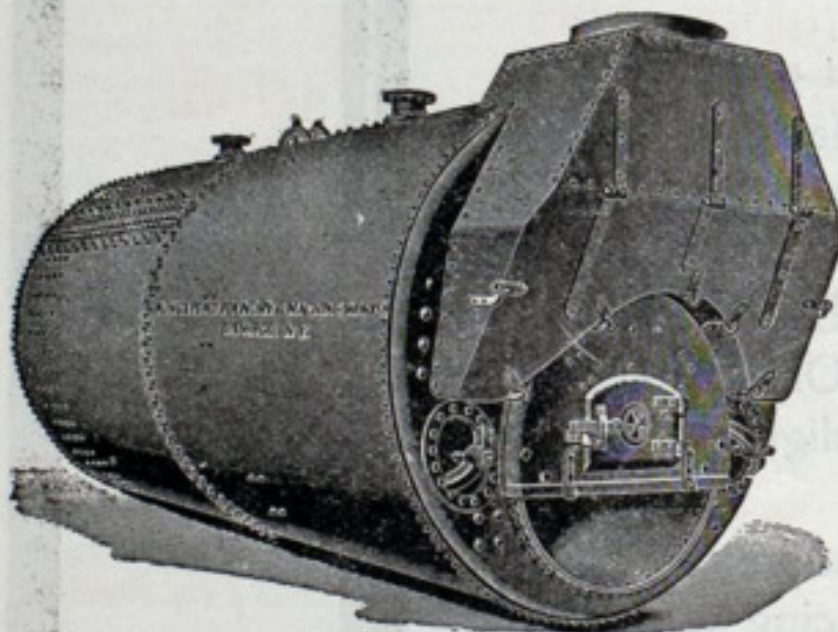
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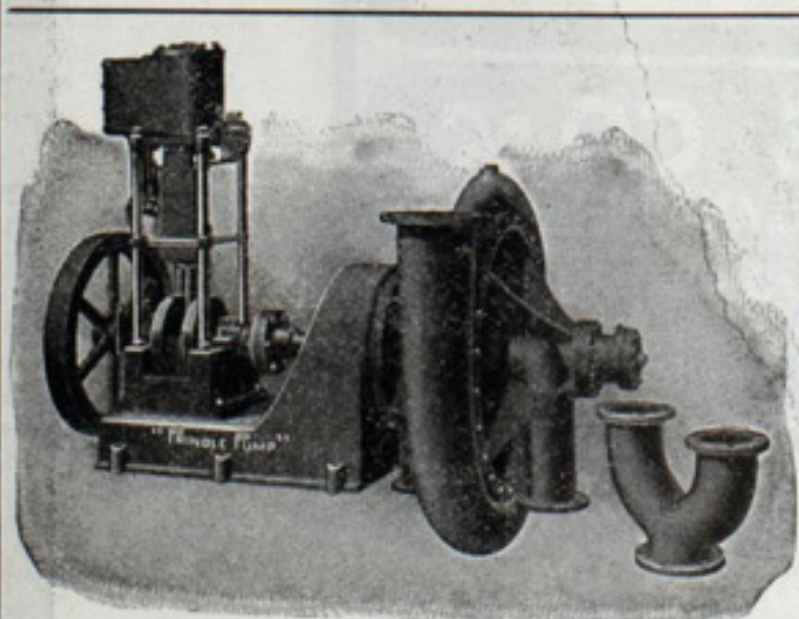
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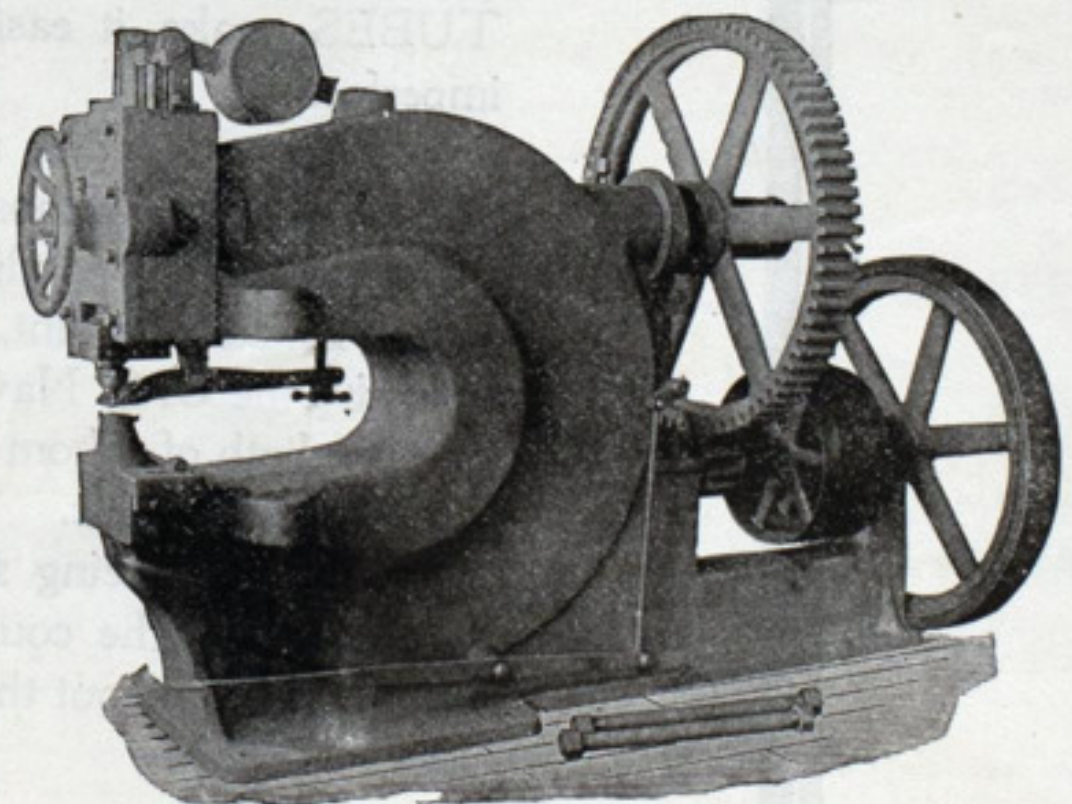
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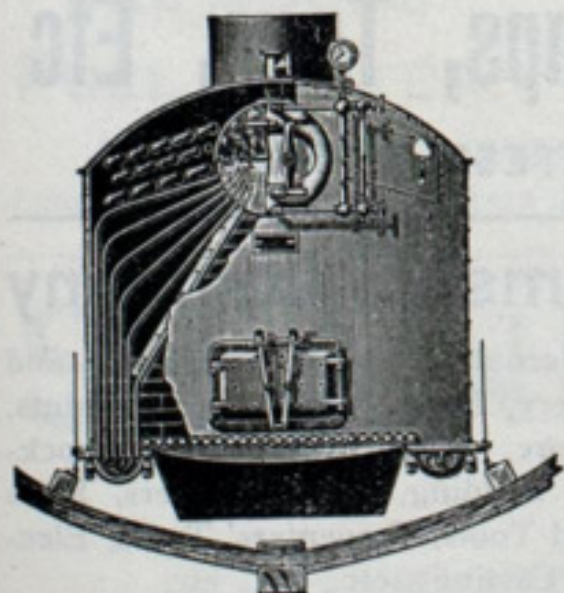
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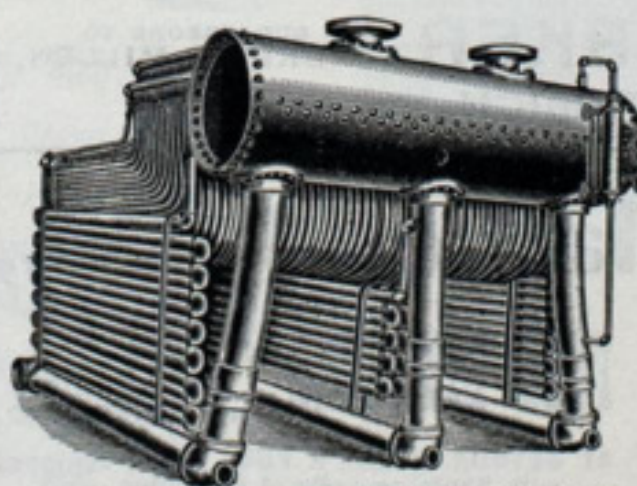
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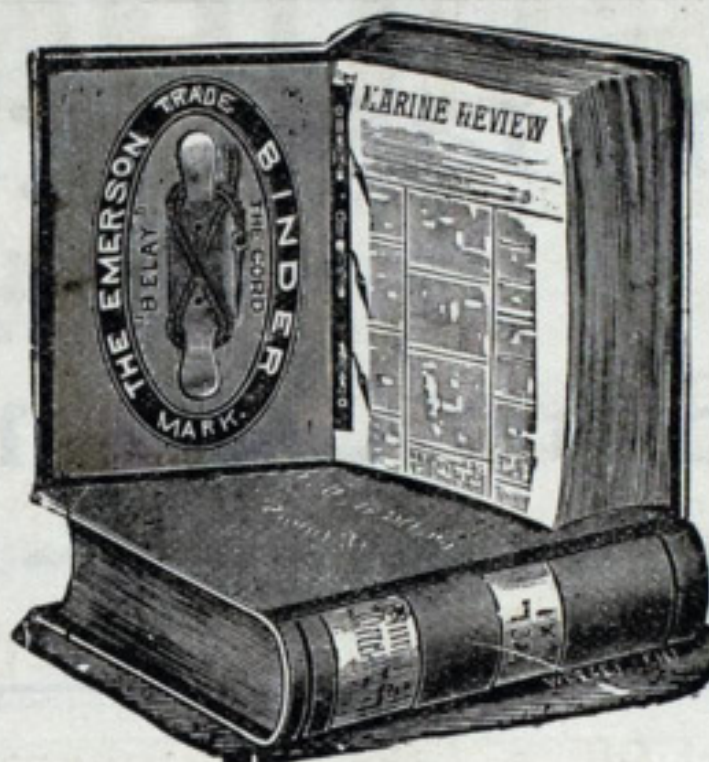
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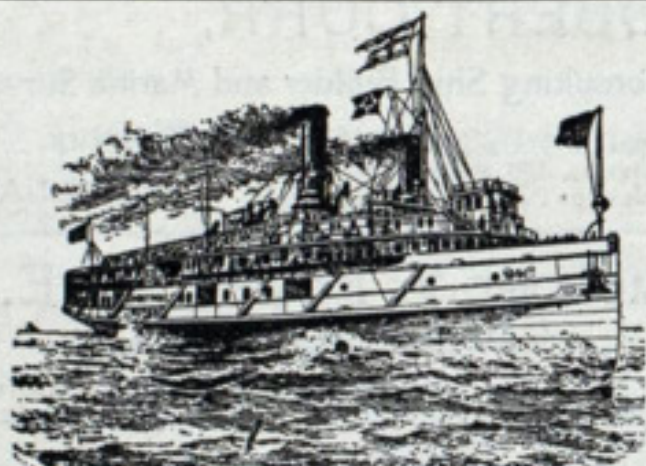
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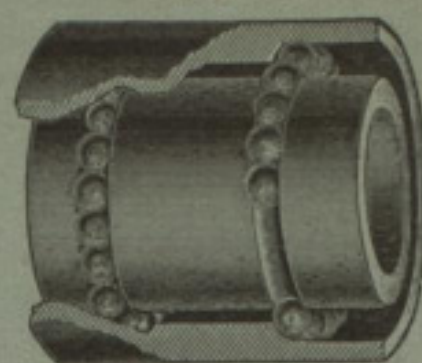
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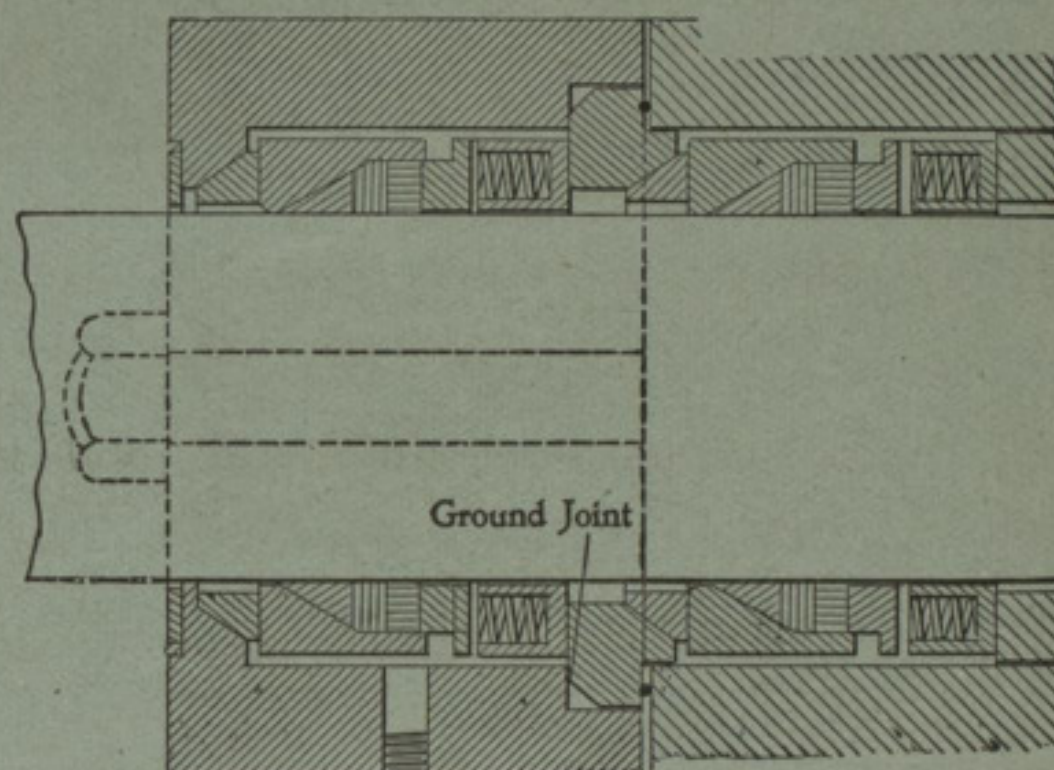
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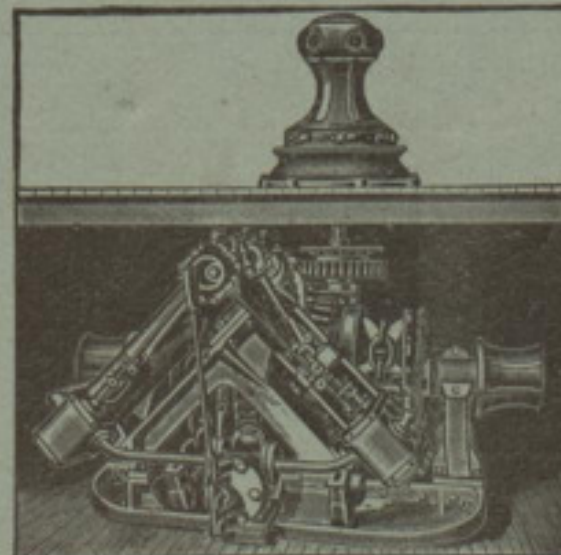
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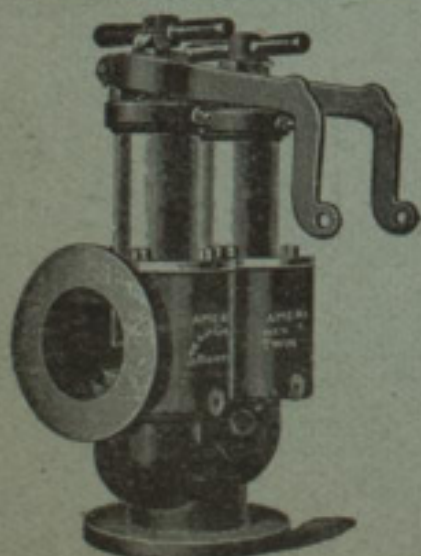
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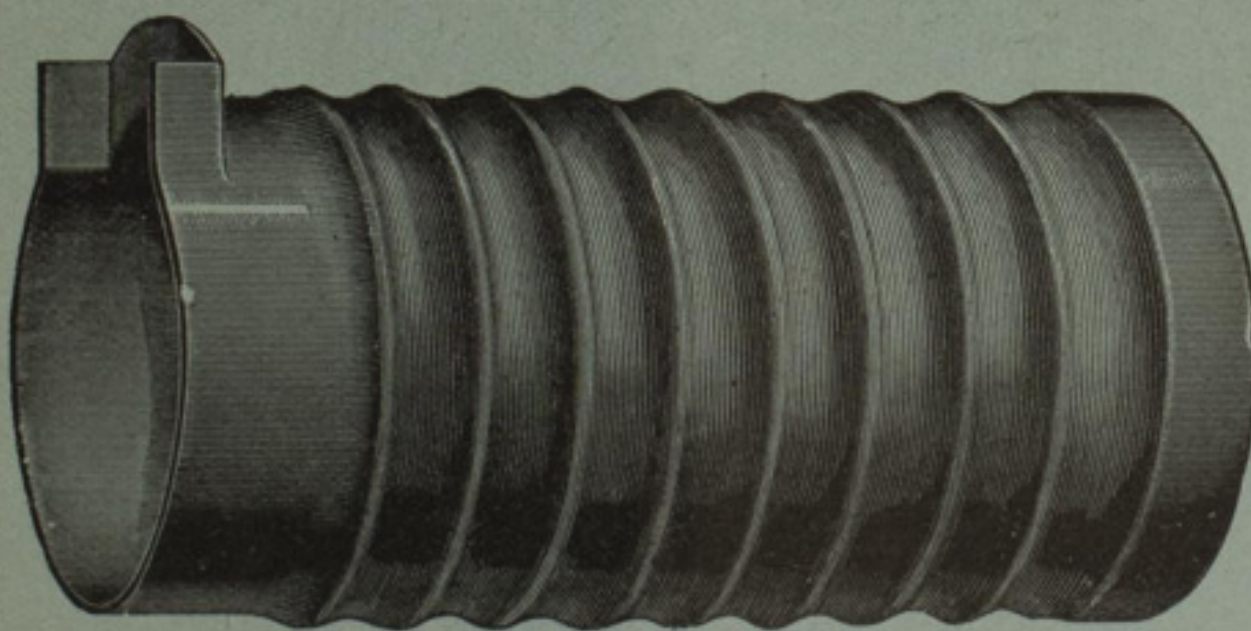
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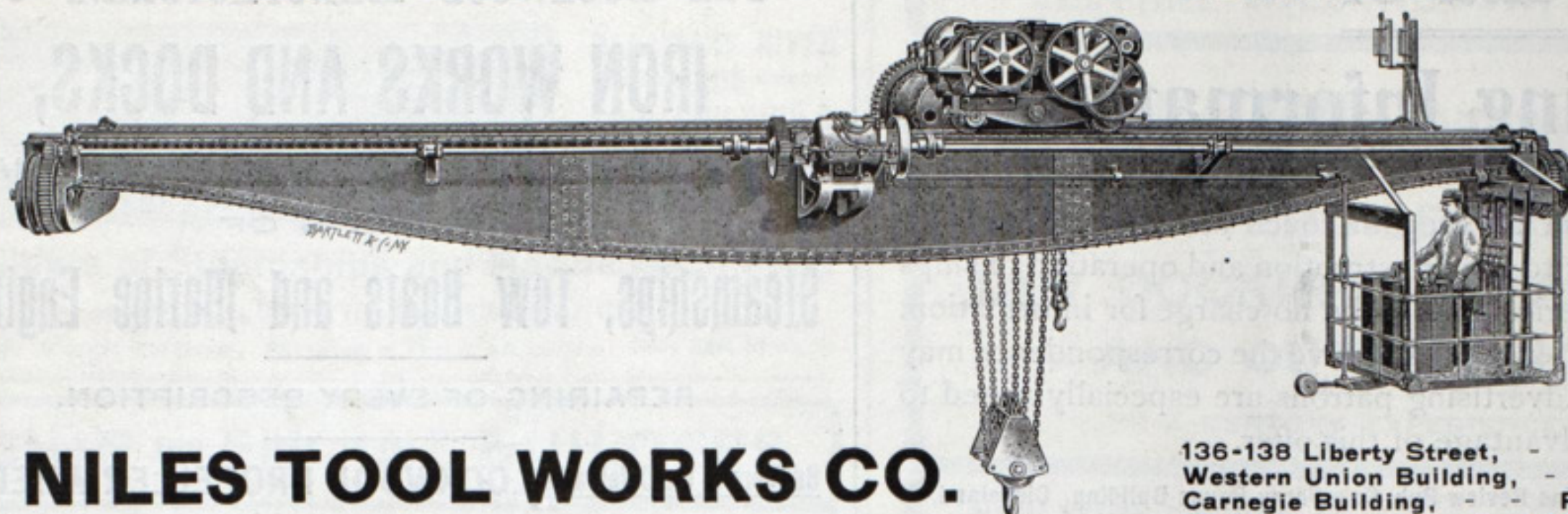
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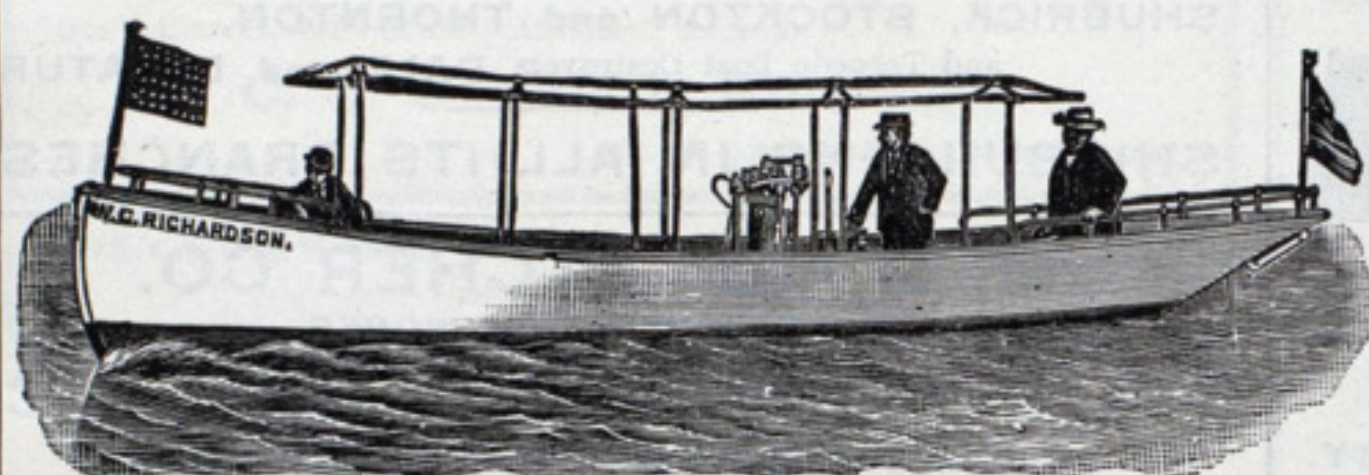
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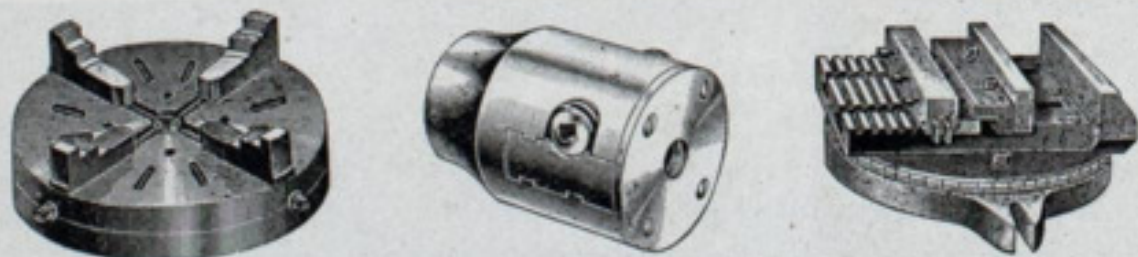
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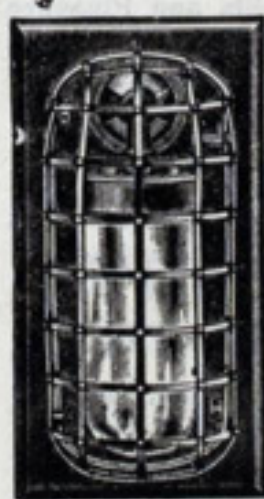
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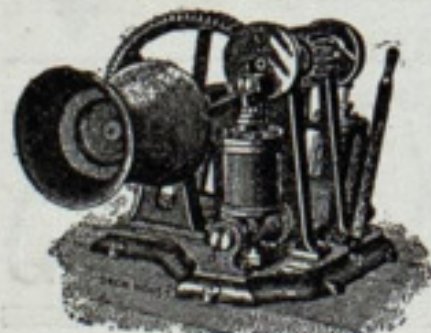


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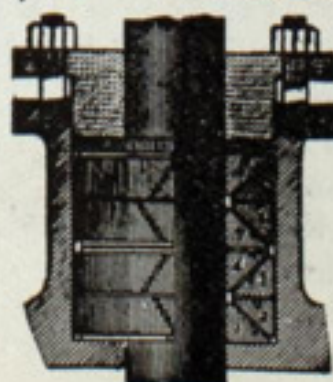
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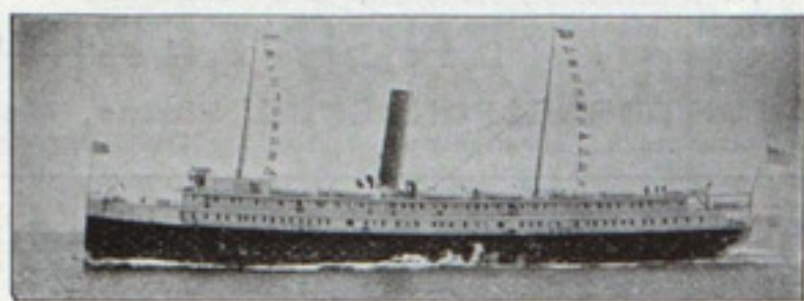
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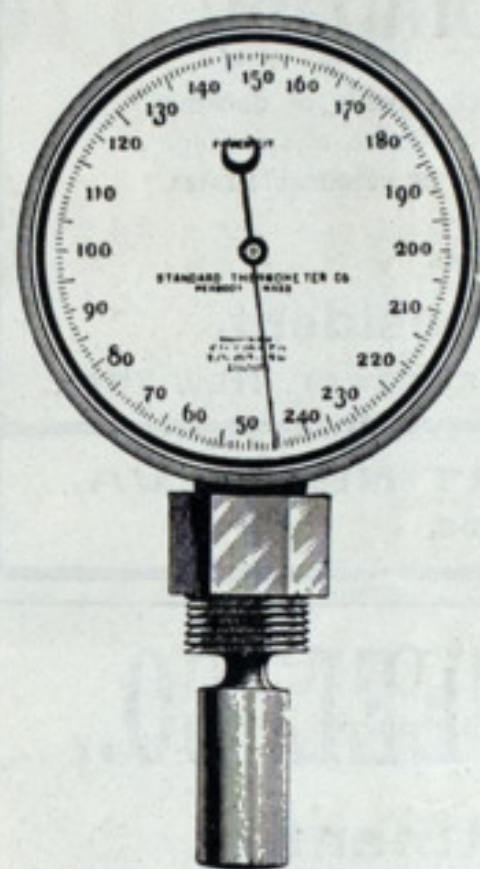
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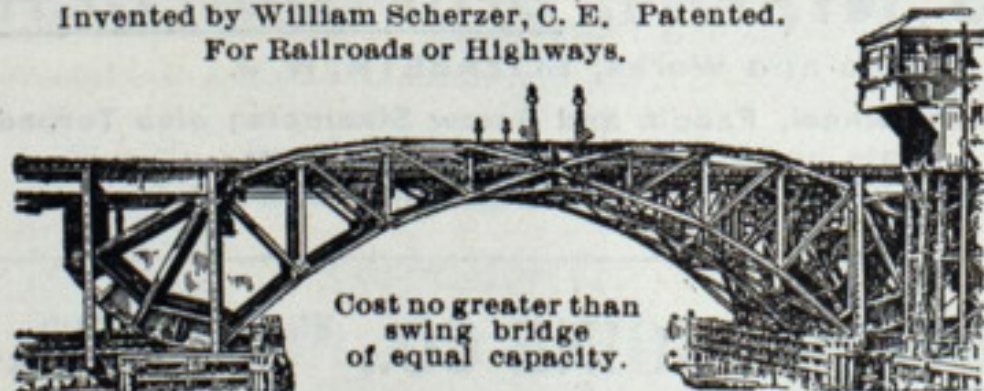
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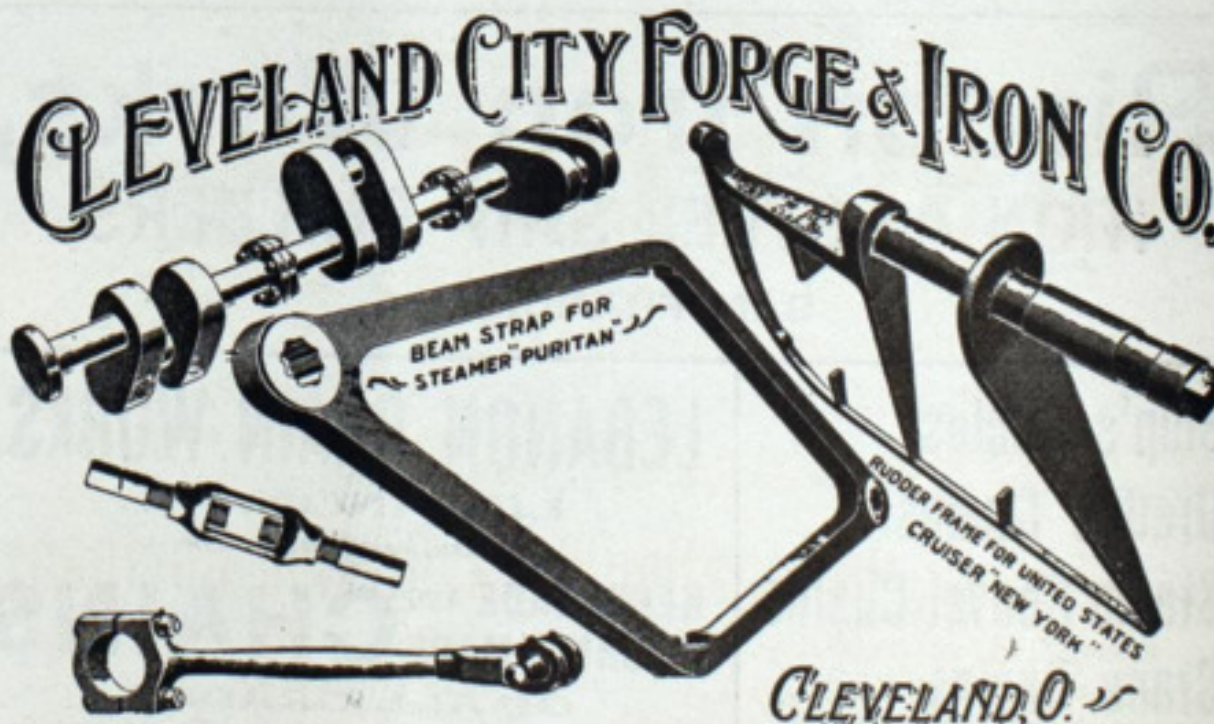
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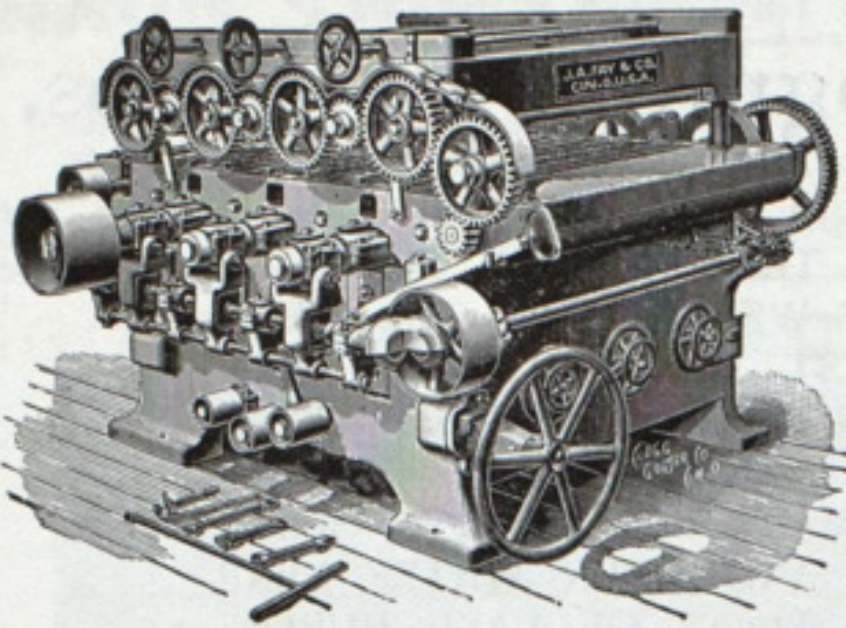
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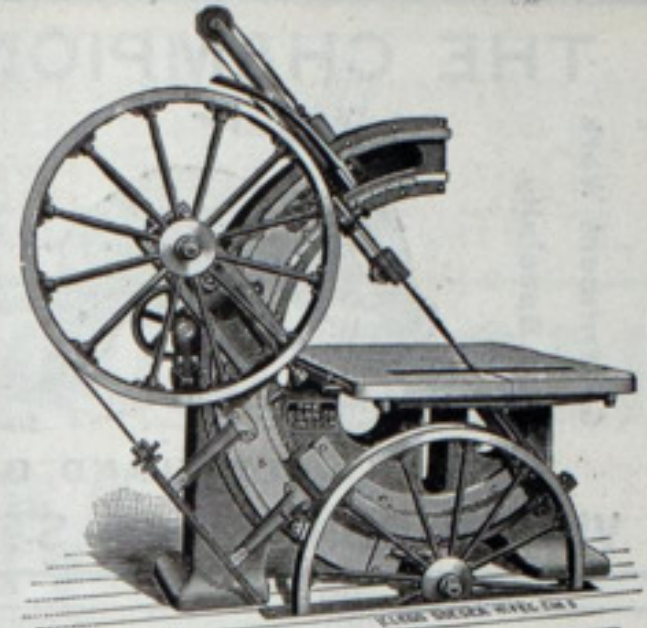
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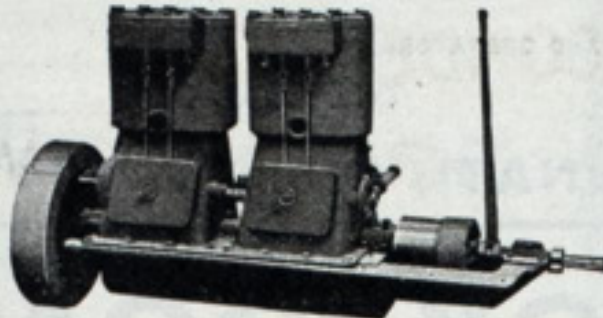
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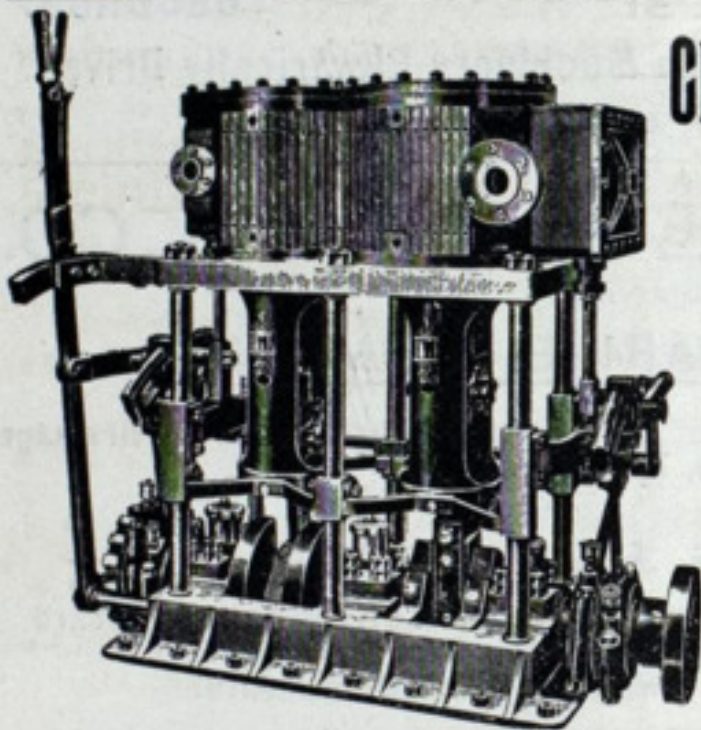
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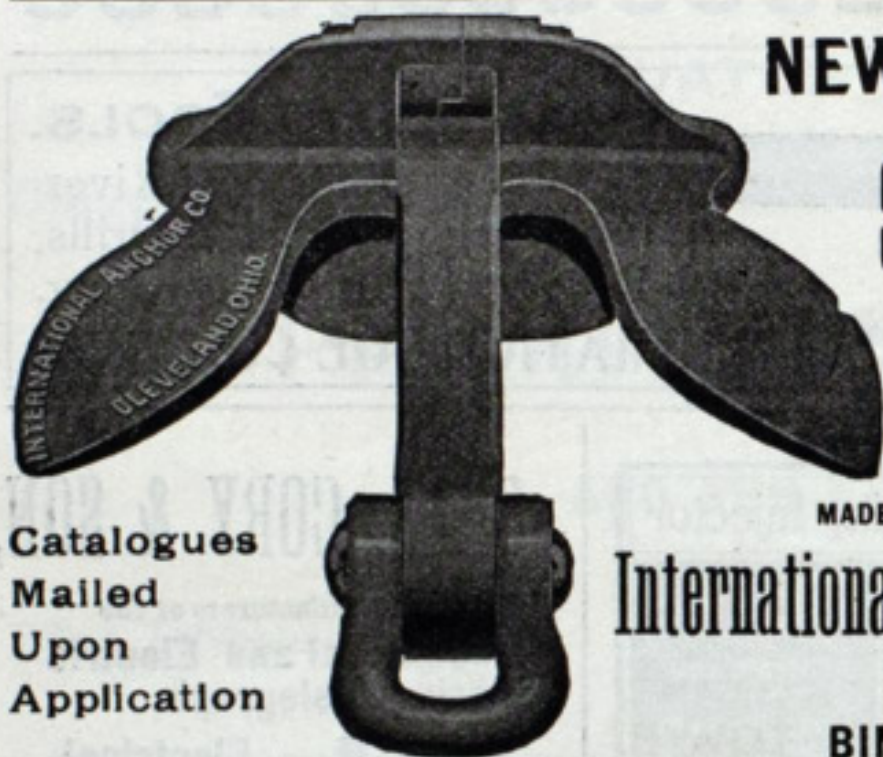
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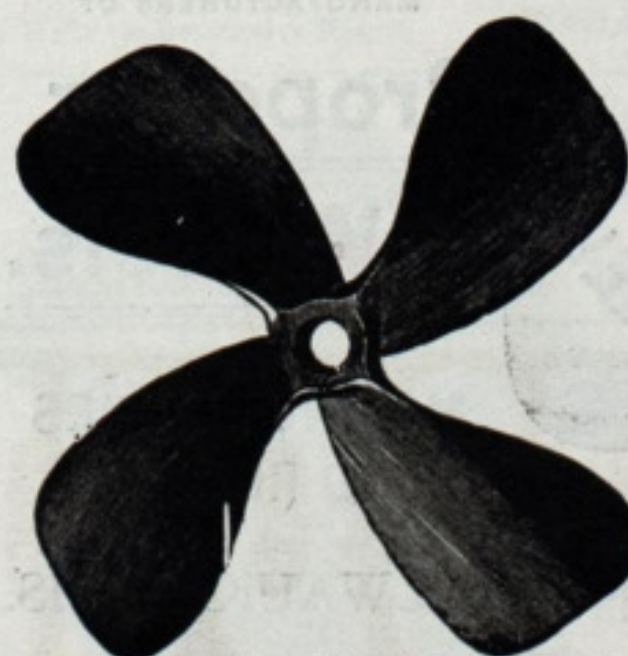
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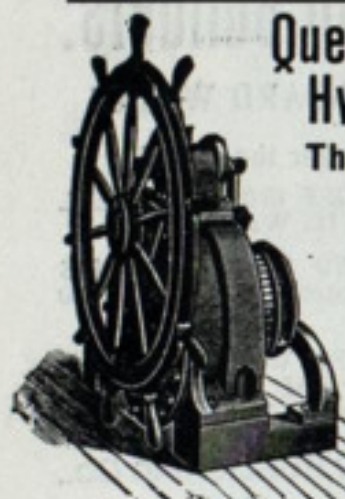
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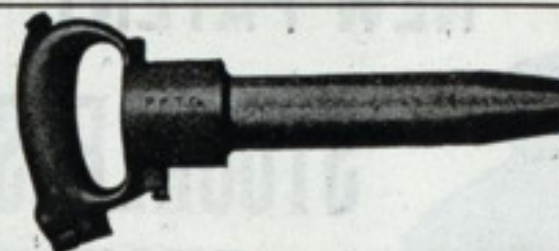
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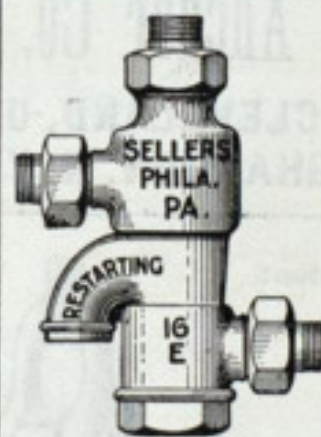


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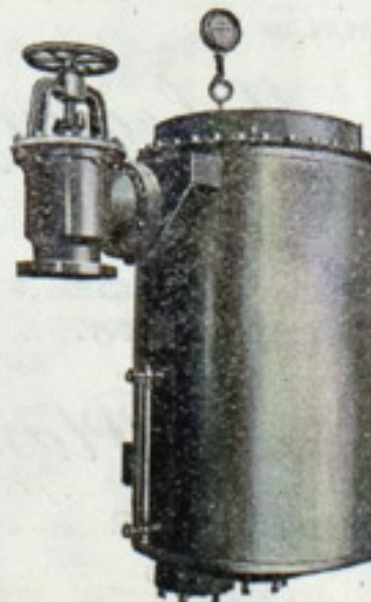
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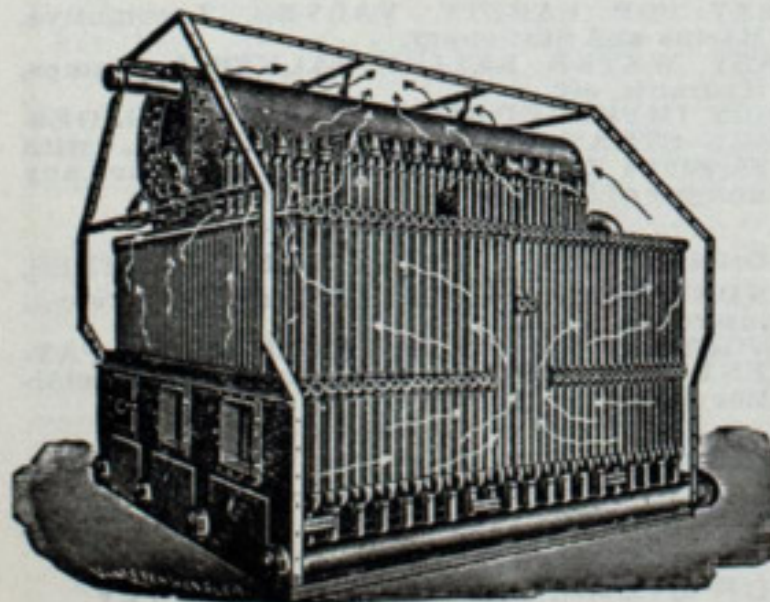
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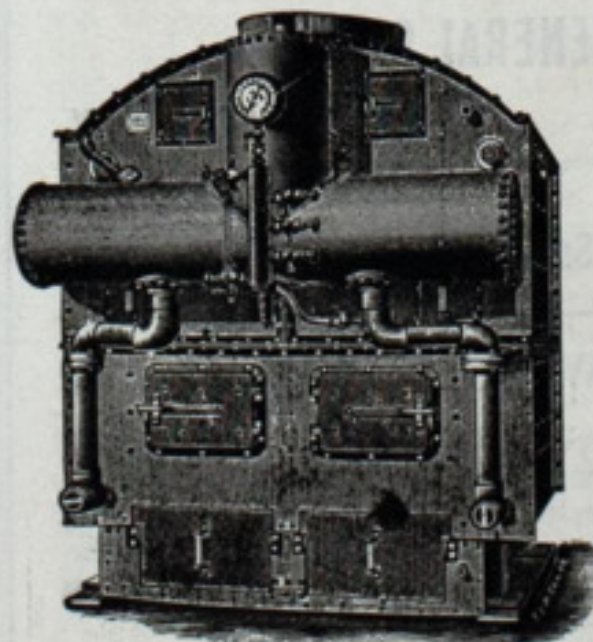


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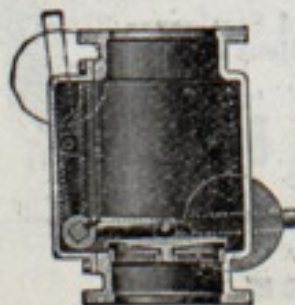


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